The RUBBER AGE

VOL. 25, No. 7 JULY 10, 1929

Late News of the Rubber Industry

Rubber Exchange Finds One Tire On Hand for Every Car Rolling

TOTAL stocks of automobile tires in hands of dealers and manufacturers at the start of the present month were equivalent to approximately one tire to each car rolling, it was estimated by members of the Rubber Exchange of New York, says a recent release from that body, following receipt of preliminary inventory figures from Akron and other manufacturing centers.

Tires in hands of manufacturers at the start of June amounted to 17,800,000 casings of all types and sizes, this report states. This compares with 16,931,000 tires at the start of May as reported the previous day by the Rubber Manufacturers' Association, an increase of approximately 869,000 tires in manufacturers' hands alone for the month.

Tires in hands of dealers at the same time are estimated roughly at about 40 per cent, bringing stocks in hands of both manufacturers and dealers up to between 24,000,000 and 25,000,000 tires. Automobile registrations at present show there are over 25,000,000 cars "rolling," based on the government registration figures of 24,629,000 cars at the start of the year. Therefore, inventories at the start of June for the rubber industry disclose that stocks on hand are equal to no more than one tire for each car rolling. And some authorities are disposed to reduce the inventory total another 15 per cent owing to the number of unsold slow moving and obsolete sizes and grades in hands of dealers.

Falls and India Unable To Agree on Merger Plan

NEGOTIATIONS between the India Tire & Rubber Company and the Falls Rubber Company for a consolidation of the two organizations have failed to win the approval of executives and stockholders of both concerns. Although proposals and counter proposals are being reconsidered by the directors of the two tire companies, the stockholders of the Falls Rubber Company on June 24 authorized a recapitalization plan for their own organization that will allow additional working capital and enable it to continue as a separate unit.

The offer by India to take over control of the Cuyahoga Falls company on the basis of an exchange of ten shares of Falls stock for one of India was rejected by the Falls Rubber Company stockholders at a special meeting, June 22. In turn, they offered a counter proposal to India, which the latter rejected, according to an announcement by the company's executives on June 25. The details of the counter proposal were not made public.

W. P. Cline, vice-president and treasurer of the Falls company, announced that the stockholders on June 24 approved an issue of $350,000 7 per cent convertible notes secured by a first mortgage on the company's property and convertible into common stock at any time within three years at the basis of $7 per share. The stockholders also authorized the increase of common shares from 24,000 to 100,000, part of which will be available for the transfer of the convertible notes.

Another change in the capital set-up was the approval of an issue of new preferred stock of $100 par value. The old $25 par value preferred will be exchanged at the rate of four old for one of the new. About 3,000 additional shares of the new preferred will also be issued.

Coincident with the announcement of the refinancing plans, the Falls company reported that more than one-third of the additional securities were subscribed for at the meeting on June 24. The new financing is to provide working capital, permit expansions and the purchase of needed equipment.

The first agreement leading toward merger negotiations between Falls and India was reached at a joint meeting of directors on May 28. It was said at that time that such a consolidation would give both concerns new outlets for their products and would enable the plants to increase production and profits. At the time of the first announcement, Falls common stock was selling at $6 a share and India at $60, but by the end of June the former had dropped to $5 and the latter to $52. Quotations at the end of 1928 were at approximately $7 for Falls and $35 for India, the latter having enjoyed a sensational rise since that time.

Hood Rubber Company Sales Show Increase This Year

THE Hood Rubber Company, Watertown, Mass., reports that April sales of tires reflect an increase over March, which in turn showed improvement over February. For the full year the tire department is expected to exceed results of 1928, both in dollar and unit volume.

In the first quarter of 1929, sales of rubber footwear, which normally constitute 60 per cent of the company's sales, were approximately $700,000, or 30 per cent ahead

of the corresponding period of 1928. In spite of this expansion, unfilled orders at the end of April were about $1,000,000 greater than a year ago. The canvas footwear department continues to run at capacity with the largest production on record and with sales showing a healthy increase. The newly introduced line of Raintogs, a type of footwear with the appearance of suede, is reported to be having a good reception.

The financial condition of the company is reported as being satisfactory. Although the first quarter of the year is usually the poorest for Hood and, because of the seasonal nature of the industry, net quick assets show some shrinkage, the company held its own this year. At the end of April, borrowings were approximately $1,500,000 less than a year ago. Rubber purchases to care for 75 per cent of this year's needs have been made under 20 cents a pound.

Last year sales of the Hood Rubber Company totaled $29,977,550, representing a considerable decrease under the 1927 sales total of $37,700,274. Operations in 1928 resulted in a net loss of $1,478,104 after writing off the crude rubber losses.

Schoenhair Flies Goodrich Plane From Los Angeles to Cleveland

ATTEMPTING to make a non-stop flight from Los Angeles to New York in record time, Lee Schoenhair, piloting the Lockheed-Vega monoplane of the B. F. Goodrich Company, was forced by weather conditions to land at the Cleveland Municipal Airport on June 22, after having completed about 2,100 miles of the Great Circle course in 13 hours and 20 minutes. He encountered further difficulties the following day in trying to resume his journey to New York, thunder showers forcing him to alight at the military airport near Du Bois, Pa., and a faulty take-off a few hours later causing the plane to crash and wrecking the entire ship.

Lee Schoenhair and the Goodrich Plane Which Was Wrecked

Schoenhair took off from Los Angeles at 3:41 A. M. on June 22 with 545 gallons of gasoline, expecting to land at Roosevelt Field, Long Island, that night and to return to Los Angeles by the evening of June 23. Weather presented no difficulties on the flight as far as Cleveland, except that he failed to find anticipated tail winds at an altitude of 1,100 feet, which he endeavored to maintain. At Cincinnati, however, he was signalled that fog on the course to New York was unsafe, and he brought his plane down at the Cleveland airport in perfect condition. Had not unfavorable weather intervened, he would undoubtedly have broken Captain Hawks' former record of 18 hours, 21 minutes, 15 seconds, for the cross-continent flight.

The following morning he resumed his course toward New York despite warnings that the weather was still bad over the Alleghanies and an hour out from Cleveland found himself flying through a line of thunder storms. The visibility was so low that he was unable to distinguish points on the ground, but he found the military airport outside Du Bois and although the rain was falling in blinding sheets he set the Wasp-powered Lockheed down on the wet field without so much as scratching it.

When the weather cleared, he tried to continue his flight. He had the plane in the air after a run of about 600 feet, but when it was up about 50 feet one wing dropped down and the ship plunged toward the ground. Schoenhair was badly shaken up, but his only injury was a cut on the chin and a bump on the head. The fuselage of the plane was cracked, the undercarriage was torn off, the left wing was shattered and the nose and the propeller were badly wrecked.

After examining the wreckage of his plane, Schoenhair said, "I guess the only thing that I can do is to remove the engine and ship it back to the factory to be put in a new plane." He declared that his failure to set a new non-stop flight record across the country had not discouraged him in regard to future attempts.

J. D. Tew, president of the B. F. Goodrich Company, was waiting at Roosevelt Field with other officials of the organization for Schoenhair's arrival in the plane, which was known as the Goodrich Silvertown. According to Mr. Tew, the plane was surfaced with a rubber paint, recently developed in the Goodrich laboratories. This rubber coating, he said, gives a smoother surface and cuts down wind resistance.

American Cyanamid in Merger With Kalbfleisch Corporation

CONSOLIDATION of the assets of the Kalbfleisch Corporation with the American Cyanamid Company has been approved by the boards of directors of both corporations, subject to confirmation by stockholders. The Kalbfleisch Corporation will continue to operate as a separate organization, and no change in the management is contemplated.

At the same time, the Calco Chemical Company, Bound Brook, N. J., one of the large Cyanamid Company subsidiaries, announced that it had taken over the plant and business of the Textile Chemical Company, Providence, R. I., and the sulphur dioxide division of the King Chemical Company of Bound Brook.

The Kalbfleisch Corporation, which observed its 100th anniversary last March, is headed by Harry L. Derby, also president of the Crown Chemical & Color Company, and manufactures chemicals for paper making, textiles, rubber and other purposes at six plants located in various sections of the country. The Kalbfleisch Corporation also maintains and operates ore mines and a plant in Dutch Guiana. As a rule, the Kalbfleisch Corporation has not issued statements of its financial affairs, but its common stock is on an annual basis of $6, having paid $1.50 quarterly up to the first quarter of the present year.

The American Cyanamid Company is a large manufacturer of mining and industrial chemicals and fertilizer materials, including sulphur, rubber chemicals and accelerators. It is also a producer of cyanides, sulphuric and phosphoric acid, ammonia, pressiates, etc., with plants in the United States, Canada and Spain.

The two companies use some of the same basic materials

in their operations, and this reorganization will create advantages through consolidation of plant facilities, research and technical developments. No announcement has as yet been made of the terms of the financing involved in the merger.

The American Cyanamid Company, incorporated in 1907, is capitalized through an authorized issue of $8,000,000, consisting of $1,600,000 Class A and $6,400,000 Class B common shares, and $10,000,000 6 per cent cumulative preferred. The common shares originally had a par value of $100, which was reduced in 1926 to $20. Voting power is vested exclusively in the Class A shares. The company's sales in 1927 reached $11,594,617, leaving a balance available for dividends of $1,356,231. During that year it earned $24.24 a share on the preferred and $3.09 on the common. The last consolidated balance sheet showed total assets, exclusive of Air Nitrates Corporation, of $32,181,052. A power subsidiary, the Holston River Power Company, only last month made application in Tennessee for permission to erect three water power plants on the Holston River at a cost of $35,000,000.

W. B. Bell is president of the American Cyanamid Company; K. F. Cooper, J. O. Hammit, W. S. Landis and E. V. O'Daniel, vice-presidents; C. M. Grant, secretary and treasurer.

Automotive Rubber Exports Lower During Month of May

THE value of all types of American casings, tubes, solid tires, sundries and repair materials exported during the month of May totaled $3,825,972, as compared with an aggregate of $4,017,441 for April. The greater part of the May exports, as usual, consisted of automobile casings other than truck and bus casings 6 inches in size or larger. In this class, 211,207 casings were exported with a value of $2,213,421. The largest single customer for casings of this type was Brazil, which took 15,418 with a value of $136,177. Following Brazil in rank were Japan, Denmark, Spain, Cuba and Argentina.

Truck and bus casings 6 inches or over exported during May totaled 31,602, valued at $907,690, with Spain again our first customer by taking 3,212 casings worth $209,017. Inner tube exports were valued at $294,891, with Cuba being our leading market. Other casings and tubes exported were valued at $10,233, automotive solid tires at $205,224, other solid tires at $40,694, and tire sundries and repair materials at $153,819.

The value of all types of rubber boots, rubber shoes, canvas rubber-soled shoes, rubber heels and rubber soles exported during May amounted to $866,168, of which canvas rubber-soled shoes were represented by $517,951. The United Kingdom was our chief customer for rubber boots and took the largest number of rubber shoes, while Cuba was our first market for canvas rubber-soled shoes and our leading customer for rubber shoes in respect to dollar value. Canada was the principal destination for American shipments of rubber soles and heels.

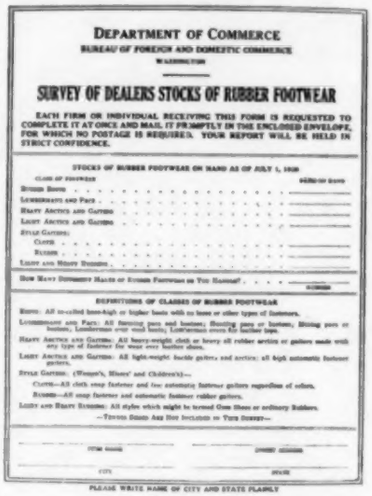
Chile led all other countries in imports of American rubber belting, while the United Kingdom was first in rubber hose. Total May exports of the former amounted to $323,407, and shipments of the latter aggregated $272,269.

During May, 2,909,131 pounds of reclaimed rubber were exported from the United States with a value of $211,060. Of this total, Canada received 2,051,008 pounds, valued at $148,495. Scrap and old rubber exported amounted to 4,585,130 pounds, with a value of $216,220. France was the chief recipient of this commodity, taking 1,655,280 pounds, valued at $68,867, while Spain followed close behind with shipments of 1,015,532 pounds, worth $53,047.

Begin First Survey of Dealers' Footwear Stocks

WITH the co-operation of the Rubber Manufacturers Association, the United States Department of Commerce is now undertaking the first comprehensive survey of dealers' stocks of rubber footwear. Questionnaire forms have gone out to retailers throughout the country, asking for a detailed report on their inventories as of July 1, and a summary of the returns received will be published by the end of the month.

Each firm or individual receiving this form is requested to complete it at once and to mail it promptly to the Bureau of Foreign and Domestic Commerce at Washington. Seven different styles of rubber footwear are listed in the questionnaire, including rubber boots, lumbermans and pacs, heavy arctics and gaiters, light arctics and gaiters, style gaiters of cloth, style gaiters of rubber, and light and heavy rubbers.



DEPARTMENT OF COMMERCE
BUREAU OF FOREIGN AND DOMESTIC COMMERCE
WASHINGTON

SURVEY OF DEALERS STOCKS OF RUBBER FOOTWEAR

EACH FIRM OR INDIVIDUAL RECEIVING THIS FORM IS REQUESTED TO COMPLETE IT AT ONCE AND MAIL IT PROMPTLY IN THE ENCLOSED ENVELOPE, FOR WHICH NO POSTAGE IS REQUIRED. YOUR REPORT WILL BE HELD IN STRICT CONFIDENCE.

STOCKS OF RUBBER FOOTWEAR ON HAND AS OF JULY 1, 1929

CLASS OF FOOTWEAR — NUMBER OF PAIRS

Rubber Boots
Lumbermans and Pacs
Heavy Arctics and Gaiters
Light Arctics and Gaiters
Style Gaiters:
Cloth
Rubber
Light and Heavy Rubbers
How Many Different Makes of Rubber Footwear do You Handle?

DEFINITIONS OF CLASSES OF RUBBER FOOTWEAR

Boots: All to-called knee-high or higher boots with no laces or other types of fasteners.

Lumbermans and Pacs: All farming pacs and bootees; Hunting pacs or bootees; Mining pacs or bootees; Lumberman over wool boots; Lumberman overs for leather tops.

Heavy Arctics and Gaiters: All heavy-weight cloth or heavy all rubber arctics or gaiters made with any type of fastener for wear over leather shoes.

Light Arctics and Gaiters: All light-weight buckle gaiters and arctics; all high automatic fastener gaiters.

Style Gaiters: (Women's, Misses' and Children's)—
Cloths—All cloth snap fastener and low automatic fastener gaiters regardless of colors.
Rubber—All snap fastener and automatic fastener rubber gaiters.

Light and Heavy Rubbers: All styles which might be termed Gum Shoes or ordinary Rubbers.

—Tennis Shoes Are Not Included in This Survey—

NAME
STREET ADDRESS
CITY
STATE

PLEASE WRITE NAME OF CITY AND STATE PLAINLY

For the purpose of the report, boots will include all knee-high or higher rubber boots, with no laces or other types of fasteners. The class of "lumbermans and pacs" will comprise all farming pacs and bootees, hunting pacs or bootees, mining pacs or bootees, lumberman over wool boots, and lumberman overs for leather tops. In the class of heavy arctics and gaiters are all heavy-weight cloth or heavy all rubber arctics or gaiters made with any type of fastener for wear over leather shoes. The light arctics and gaiters division will be made up of all light-weight buckle gaiters and arctics, together with all high automatic fastener gaiters. Style gaiters are subdivided into two classes, the first including all cloth snap fastener and low automatic fastener gaiters regardless of colors and the second comprising all snap fastener and automatic fastener rubber gaiters. Light and heavy rubbers, of course, include all styles which might be termed gum shoes or ordinary rubbers. Tennis shoes are not included in the scope of the survey.

There is space reserved on the blank for the dealer to indicate how many different makes of rubber footwear he handles. All information given in answering the questionnaire is completely confidential, as in the case of the tire dealers' stocks surveys.

The Department of Commerce is reported to be using the mailing lists of certain of the larger rubber footwear companies in sending out these first survey questionnaires. As these lists contain not only customers but prospects, it is believed that they represent a high degree of coverage of the entire field. In the fall a similar survey will be made of dealers' stocks of canvas rubber-soled footwear.

Mechanical Goods Manufacturers Name Officers for Coming Year

THE first meeting of the year of the Mechanical Goods Division of the Rubber Manufacturers Association was held at the Yale Club, New York City, last month. A. F. Townsend, president of the Manhattan Rubber Manufacturing Company, was elected chairman of the

division, and W. Gussenhoven, of the United States Rubber Company, was elected vice-chairman.

The following were elected members of the executive committee of the division to serve for one year: J. A. Lambert, Acme Rubber Manufacturing Company; A. C. Kingston, Boston Woven Hose & Rubber Company; C. D. Garretson, Electric Hose & Rubber Company; C. E. Cook, The B. F. Goodrich Company; D. R. Burr, Goodyear Tire & Rubber Company; A. B. Cornell, Hamilton Rubber Manufacturing Company; F. E. Miller, Hewitt-Gutta Percha Rubber Corporation; and J. H. Cobb, New York Belting & Packing Company.

In accordance with the usual practice, a specification committee was appointed to serve during the ensuing year. Those appointed to the committee were: V. A. Cosler, The B. F. Goodrich Company; H. E. Morse, Goodyear Tire & Rubber Company; L. J. Howell, Hamilton Rubber Manufacturing Company; J. M. Cranz, Hewitt-Gutta Percha Rubber Corporation; W. L. Sturtevant, Manhattan Rubber Manufacturing Company; C. H. Zieme, Republic Rubber Corporation; and W. H. Cobb, United States Rubber Company.

The existing recommendation of the Mechanical Goods Division, that August 1 be adopted as the opening date for each garden hose season, and the existing "Memorandum of Sale for Garden Hose" were approved to apply to the 1929-1930 reason.

A number of other subjects of current interest were discussed at some length and will be the subject of consideration by members of the division pending future meetings.

Dominion Rubber Reorganized Similarly to U. S. Rubber

REORGANIZATION of the Dominion Rubber Company, Ltd., Canadian subsidiary of the United States Rubber Company, along the same general lines as took place recently in the parent company, has been announced by W. A. Eden, president. Following what is generally accepted as the assumption of control of the United States Rubber Company by the duPont interests, the firm was reorganized into separate departments or companies, each directed or operated by a general manager, similarly to the divisional organization of the General Motors Corporation.

W. A. EDEN

In the case of the Dominion Rubber Company, Ltd., four general managers of as many divisions have been appointed, and seven general service departments have been created which may be consulted or used in any way by the general managers. Mr. Eden has announced the following appointments:

George Bergeron — General Manager, Distributing Branches.

G. W. Charles—General Manager, Footwear.

W. M. Carment—General Manager, Mechanical Goods and Sundries.

J. A. Martin—General Manager, Tires.

The general service departments which have been set up are as follows: Finance and Accounts, Planning and Engineering, Development, Industrial Relations, Advertising, Purchasing and Traffic, and Legal and Patent.

Other appointments include the following: J. M. S. Carroll, general sales manager in charge of mechanical and sundries sales; M. L. Douglas, general manager in charge of tire sales; E. I. Cooper, general footwear factory manager; D. A. Fisher, factory manager, Papineau footwear and Rubber Regenerating plants.

Goodyear Building Sixth Blimp; Appoints Collins Zeppelin Head

ANNOUNCEMENT has been made that the Goodyear Tire & Rubber Company will construct a new dirigible for company use, which will have a capacity of eight passengers and be approximately 50 feet longer than the Puritan type of dirigible now in service. The new ship will be named the Defender, will contain 160,000 cubic feet of helium gas, will be 172 feet in length and will be powered with two Wright J-6 motors of 150 horsepower each. The ship will be of the type identified as "PA" in military circles.

Meanwhile the Vigilant, the newest of the Puritan type of dirigible, is nearing completion and will be housed at Wingfoot Lake with the Puritan and Pilgrim, the latter the oldest and smallest of the fleet. The new Volunteer was recently assembled at the naval base at Arcadia, Cal., and is operating there in co-operation with the Los Angeles tire factory. The dirigible Mayflower has been flown to the Round Hill Airport of Colonel E. H. R. Green at South Dartmouth, Mass., to be used in connection with the research work of the Massachusetts Institute of Technology. Studies in aerial navigation in fog, communication and meteorology will be conducted from the Mayflower, according to P. W. Litchfield, president of the Goodyear Tire & Rubber Company and also of the Technology Alumni Association.

Plans have been announced for the construction of a dirigible hangar at Gadsden, Ala., near the new Goodyear tire factory in that city. The hangar, which will be completed by August 1, will be 200 feet long, 75 feet high and 72 feet wide. It is probable that the Vigilant will be stationed there when it is completed. Late reports place the date for the formal opening of the Gasden tire factory at July 11, the first tire from the molds there already having been completed on June 22.

Mr. Litchfield has announced the appointment of W. H. Collins as general superintendent of the Goodyear-Zeppelin Corporation, which is building two super dirigibles for the United States Navy, thus continuing the association between surface ships and airships. Since his graduation from Lafayette in 1915, the entire engineering experience of Mr. Collins has been in the construction of sea going ships—first, with the Newport News Ship Building Corporation and from 1917 on with the Bethlehem Ship Building Corporation.

As hull superintendent at the Quincy plant, Mr. Collins helped construct the great airplane carrier Lexington. The ZR S-4 and ZR S-5, as the two navy ships are designated, will have approximately the same length and beam as the Lexington, but will weigh only 110 tons each, as against the 36,000 tons displacement of the Lexington, and will be powered by eight 600 horsepower motors.

Toxic Substances *in the* Rubber Industry

PART 1

By P. A. DAVIS, A.B., M.A., M.D.

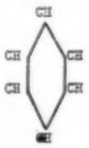
Assistant Medical Director, Goodyear Tire & Rubber Company

BENZOL

THE subject "toxic substances" is more or less a relative term, inasmuch as there are many factors which might determine whether the toxicity of any substance is sufficient to class it as an industrial poison. There are many such substances used and their toxicity is diminished by the manner in which they are used.

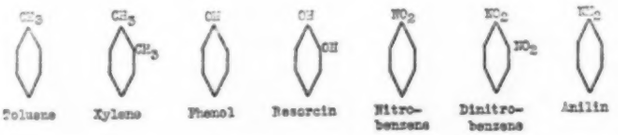
The first substance to be discussed in this series is benzol and is known as a solvent. In the present operative scheme of the rubber industry it is of vital importance, both as a solvent and drying agent.

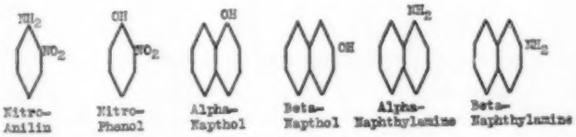
Benzol, benzene C_6H_6 C.P. is a chemical compound consisting of six atoms of carbon and hydrogen closely bound in a ring formation.



This carbon ring may be classed as the mother of numerous derivatives which are used in the rubber industry and embraces solvents, accelerators, anti-oxidants and dryers. For example,

and from these combinations numerous products results by substitution of which a few primary ones are indicated.





From these combinations innumerable substances are produced.

Benzol, the mother substance, is a clear, colorless substance. Very volatile, very explosive, and its vapor is heavier than air. It is obtained from distillation of coal tar and is purified by re-distillation at 79°-80°.

There are several grades of benzol used in industry:

1. Benzol C_6H_6 C.P. Boiling point, 79.7°.
2. Benzol—90%. This is 90% of the distillate up to 100°. Composition—80-85% of benzol. 13% to 15% of toluene, 2-3% xylene and 1% heavy residue.
3. Benzol—50%. This is 50% of distillate below 100°, 90% below 120°. Composition 45-50% benzol, heavy residue of olifins, parafins and complex bodies and some toluene.
4. Solvent Naptha. Consists chiefly of xylene, a small amount of toluene and thiophene.

Benzol must not be confused with gasoline or benzine, which is obtained from distillation of petroleum and is a mechanical mixture of the hydrocarbons of a lower series C_5H_{12} to C_6H_{14}. Its composition varies at different boiling points. At 36.3° C. it contains 60-70% pentane C_5H_{12}. Products distilling between 30°-70° C. is the ordinary commercial gasoline. From the numerous solvents that have been tried benzol and benzine appear to be the ones universally used today.

Benzol is much more toxic than benzine and I believe that benzine will replace much of the benzol in use on certain operations in the rubber industry, unless such operations can be carried out under suction ventilation.

In considering any substance from the standpoint of its effects on the human system it is necessary to know the chemistry of the particular substance and its modes of entrance into the human system. The chemistry of benzol can be found in any good textbook on organic chemistry.

The effects on the human system I will endeavor to describe after examining and observing about 7,000 men and women who have worked with various substances containing benzol over a period of 12 years.

There are three avenues of entrance for benzol or any other volatile substance into the body:

1. Respiratory system.
2. Alimentary system.
3. Skin.

The percentage which enters by the various avenues depends on the nature of the substance, but in case of benzol I believe that 90-95% enters by the respiratory system. Skin absorption is very small except in those cases where the worker habitually washes his hands and arms in benzol to remove dirt and grease. This procedure should be condemned as unsafe. Some absorption by the alimentary system when food is taken that has been in lockers where there is a benzol vapor present. Some benzol is intermixed with secretion from the throat and mouth and swallowed. The greater the concentration and the vapor tension the greater the absorption, and the opposite is also true. This can be reduced to a minimum by proper ventilation and supervision. The human body exists today as a defensive organism and is probably a survival of the fittest, therefore we are able to compensate and tolerate small quantities of toxic substances, but when the intake factor is greater than the output factor the human mechanism must suffer. Certain individuals can tolerate large amounts of benzol and they seem to develop an immunity against it or a tolerance for it.

When the tolerance is exceeded, certain symptoms develop and these are warning signals. The most common symptoms which develop are outlined as follows:

1. Peculiar brackish taste.
2. Slight giddiness.
3. Unsteady vision and beginning headache.
4. Nausea and vomiting.
5. Dizziness—"benzene jag"—odor of benzol.
6. Weakness.

Benzol breaks down the body defense against acute infections and many secondary conditions develop, such as:

1. Trench mouth.
2. Boils.
3. Pustular skin conditions.
4. Frequent colds.
5. Arthritis.
6. Gastro-intestinal infections.
   Hektoen has done much work on the effect of benzene on anti-body formation (*Jour. Inf. Dis.*, July 1916-19, No. 1).
7. Increased nervousness with increased pulse, nose bleed, uterine bleeding, bleeding from gums.
8. Slight temporary increased B.P.
9. Excessive fatigue at end of 8 hours work.
10. Marked tremors of hands.
11. Loss of equilibration in the dark.
12. Gastric and intestinal disturbances.
13. Paraesthesia—numbness, tingling.
14. Insomnia—in the first stages drowsiness and in later stages insomnia.
15. Loss of weight—benzine pallor.
16. Benzene purpura, nose bleed, anemia. (Many thousand blood counts show that this is one of the main factors that the industrial physicians must rely on to show the effect of benzol on the individual.)
17. Menstruation every 2 or 3 weeks.
18. Dermatitis.
19. Nephritis.
20. Labored respirations and coma.

There first develops a slight leucopenia and erythropenia with a slight hemoglobin reduction. With increased absorption this progressively gets worse and the following develops:

1. Increased leucopena.
2. Increased erythropenia.
3. Lymphocytosis.
4. Development of few transitionals. A point is reached where the blood forming organs are nearly suppressed and new cells do not form rapidly.
5. Decrease in coagulation.
6. Decrease in blood calcium.
7. Decrease in antibody formation.
8. Severe decrease in hemoglobin formation with increase of hematin in the urine.
9. The beginning of endothelial lining cells to appear in the blood stream. The appearance of these cells indicates the serious if not fatal stage of the poisoning.
10. Complete cessation of formation of new blood cells.

I have observed in a few cases a condition of vaculation in the leucocytes, but this is not a constant factor. It probably is due to the inability of the cells to retain fatty compounds, and I believe that fatty substances are either extracted or prevented from forming in the nerve tissue, thus producing the nervous complex.

The effects of benzol are accumulative, more lasting and more severe than those of gasoline.

Temporary exposure to slight concentrations of benzol or gasoline are transient and a complete aeriation causes the effects to disappear. It is the constant absorption of small amounts daily that produces the detrimental effects.

When one is cognizant of these factors, what should he do to correct them? There are many things which he must consider:

1. Is the substance being used of vital importance to the industry?
2. Can a substitute of equal value be used?
3. Can ventilation be properly installed, and will it be economical to do so? Sometimes money paid out for compensation is greater than the over-head cost of installation of preventive measures.
4. Is it possible to instruct the supervisors?
5. What is the co-operation between management and safety department?
6. What is your competitor doing?

It is the concensus of opinion among industrial physicians and "safety first" men that prevention is an asset and a contented personnel breeds efficiency.

Following much study and experience, the following preventive measures are working very efficiently where much benzol is used:

1. Installation of proper ventilation and safety devices.
2. Employing only healthy individuals on operations using benzol, and preferably males.
3. Educational program.
4. Frequent examinations; especially of the blood.
5. Substitution products for benzol when possible, such as gasoline (high test), etc.

Proper ventilation is the great factor with any volatile substance and in case of benzol one must know that the gaseous form is heavier than air and seeks the lowest level, often times forming pockets or traveling to a floor below its point of liberation. Suction ventilation at low levels is most efficient.

Workers that are undernourished, anemic individuals, those afflicted with bronchitis, any pulmonary conditions, heart or kidney infections should not work where the concentration of benzol is very high. Alcoholics can tolerate more benzol fumes than non-alcoholics.

All persons working in departments where benzol is used should have frequent examinations, by this I mean blood-pressure, urine analysis, blood counts, hemaglobin estimations, vision, sensory and equilibrium examinations. These examinations should be made every 30 to 90 days, depending on the concentration of the benzol fumes to which the individual is exposed.

All supervisors and workmen must be instructed as to the physical and toxic properties of benzol and see that the precautions are obeyed.

Substitution products for benzol should be used in all processes where it is possible without detriment to the manufactured product.

Proper physical supervision of the workers in departments where benzol fumes are at a high concentration will control the situation very nicely. The following factors have, in my experience, given a very good working schedule. If, after examination, any of the following conditions are present the individual is removed from contact with benzol:

1. Headaches developing at mid-day and thereafter.
2. Visual disturbances (transitory).
3. Increased blood pressure.
4. Nervousness and a disturbance of equilibrium.
5. Any of the following blood changes:
   (a) Slight purpura or hemorrhages from mucous membranes or other organs.
   (b) Reduction of white blood cells of 1,500 below normal.
   (c) Reduction in red cells 10 to 15% below normal.
   (d) Reduction of hemaglobin below 80%.
   (e) Slight variation in coagulation time.
   (f) Any menstrual disturbances in female workers.

If close supervision is instituted these conditions can usually be corrected by change of jobs and a complete aeriation of the human system. However, the following schedule of treatment has worked very successfully:

1. Elimination.
2. Aeriation.
3. Treatment of gastric disturbances.
4. Treatment of secondary anemia.
5. Supportive measures for the heart and kidneys.
6. Stimulation of the blood forming organs by use of iron compounds, x-ray to long bones, liver and spleen substances and blood transfusions.
7. Nourishing foods with excess of animal fats.
8. Increase calcium intake.

CONCLUSION

In conclusion it must be re-iterated that benzol is one of the toxic substances used in the rubber industry. Its toxic effects can be reduced to a minimum by observing the preventive measures outlined in this discussion. It presents a definite fire hazard and, because of this fact, it has been combined with other volatile substances, chiefly carbon tetrachloride, which reduces the point of ignition but adds another toxic substance which will be discussed later.

To Standardize Grommets

At a preliminary conference of representatives of manufacturers of hard rubber products held at the Bureau of Standards recently, the simplification of grommets was discussed. A simplified practice committee is being appointed to conduct a variety survey and from the data thus obtained work out a tentative recommendation for sizes to be considered at a subsequent general conference of all interests.

New York Rubber Division Group Holds Symposium on Ageing

Accelerated vs. Natural Ageing is the Subject of Seven Papers—Present Test Methods Fail to Show Any Correlation as Between Each Other—Meeting Follows Dinner

THE New York Group of the Rubber Division of the American Chemical Society held its second meeting of the 1929 series at the Town Hall Club on the evening of June 21. Preceding the meeting an excellent dinner was served to the 165 members and guests present. Papers and the discussion were given over to a symposium on the subject of "Natural vs. Artificial Ageing."

The evening was further enlivened by the admirable performance of W. H. Grote, of the Overman Cushion Tire Company, who performed a remarkable experiment in removing signs of age from knotted rope, and the quartet of the Manhattan Rubber Manufacturing Company which at intervals rendered parody songs on a number of the well-known members of the Group. To the tune of "The Dummy Line," "Johnny" Bierer, the inventor of the famous "bomb," came in for a verse to the effect that he was getting "away with murder on his Boston line" and Doc Somerville was told that while the Vanderbilt line "was a red hot line" he could "ruin any compound with that Vanderbilt Line."

Aside from the good fellowship displayed at the meeting the papers read showed a profound study of the subject of the evening and the discussion and interest on the part of the members demonstrated the serious purpose back of these meetings of the Rubber Groups.

The meeting was opened after the dinner by Chairman W. B. Wiegand, of Binney & Smith Company, who spoke briefly on the present problems facing rubber chemists in connection with accurate tests on ageing and the inadequacy of the present accepted methods as definite bases for determining results. He stressed the fact that, in general the rubber chemists were at sea as far as settling upon one definitely accurate test was concerned and said that for that reason the matter was particularly timely as a subject for a free exchange of technical experience from the chemists of the trade. He said he was particularly happy to announce as the first speaker one of the rubber chemists who had contributed so much through his inventions to the subject of artificial ageing. He then introduced "Johnny" Bierer, of the Boston Woven Hose & Rubber Company.

Abstracts of Papers

Types of Artificial Ageing Tests. JOHN W. BIERER, *Boston Woven Hose & Rubber Company.*

It was pointed out that there are a number of factors which effect the ageing of rubber—oxidation, heat, mechanical work, after vulcanization and sunlight. No test could be expected to completely duplicate all these conditions. The four commonly used methods are the Geer oven, the Bierer-Davis oxygen bomb, the Fadeometer and Ultra Violet Light. The Geer oven stresses unduly the heat effect and insufficiently the oxidation. There are certain types of compounds in which this test gives misleading results. The oxygen duplicates oxidation very nicely, but in no way shows what a stock will do in the sunlight. Neither the Fadeometer nor the Ultra Violet Light duplicates the effect of sunlight, and there is very urgent need for a good artificial sunlight test. It was pointed out that it is impossible to set any definite number of hours in the bomb equal to one year of natural ageing, because the conditions of natural ageing vary tremendously in regard to both temperature and humidity. It was also pointed out and the results show that in five years' experience in actual factory practice we have not found a single case where the bomb has given misleading results and that from a practical standpoint it is very much worthwhile. From a strictly theoretical standpoint it does not accurately duplicate natural ageing.

Correlation of Various Ageing Tests with Shelf Ageing. SIDNEY M. CADWELL, *United States Rubber Company.*

The various ageing tests do not correlate closely with each other or with shelf or sun ageing, there is a large probable error. There is no correlation between cracking under tension in the sun and deterioration in the sun or on the shelf, or at 158°F., or in the oxygen bomb. Correlation involves the assumption that the deterioration curves are parallel. Such parallelism we believe does not exist.

Good correlation is not to be expected between the various ageing tests themselves and between that and shelf ageing, because shelf ageing depends upon temperature, light, access to oxygen, tension on the rubber, mineral fillers, copper, manganese, or iron, and organic chemicals. In addition there are certain factors in the accelerated ageing tests which do vary and which cause wide variation in the results. The more important factors are: humidity and temperature. A properly compounded and cured stock will, in general, age well. But impurities that slip in or variations in the cure may well give bad ageing. The use of antioxidants are insurance. Except for cracking under tension in the sun they make any stock age better whatever the impurities, whatever the cure, or whatever the conditions. This is a broad statement but we have observed no exceptions.

Natural vs. Artificial Ageing. STANLEY KRALL, *Fisk Rubber Company.*

A pure gum stock, a first grade and a reclaim tread stock were aged by four different methods: (1) in the dark, (2) exposed to the weather, (3) in the Geer Oven, and (4) in the Bierer Oxygen Bomb. The results show that, for all stocks, there is no general correlation between either method of artificial ageing and either method of natural ageing, therefore a general statement cannot be made in regard to a time in the bomb or oven which will duplicate

a definite period of natural ageing. However, the trend of the natural ageing physical property curves can be duplicated by either artificial method, but the rate of artificial ageing by either method must be determined for each particular stock. It is also very important that the method of artificial ageing be one that will best duplicate the ageing and service conditions to which any particular stock is subjected.

Correlation Between Geer Oven and Natural Ageing of Selected Compounds. A. H. NELLEN & H. M. SELLERS, *Lee Tire &Rubber Corp.*

Attempts were made to correlate Geer oven tests with natural ageing tests, but all generalizations were open to objections. It was found that natural aged results showed carcass or tread compounds, accelerated with an aldehyde amine type of accelerator, aged better than compounds of the same nature accelerated with a guanadine. In a Geer oven the differences were not so pronounced. It is evident that the difference in degree of correlation is due to the accelerator used and if the Geer oven results were used without supporting data, an erroneous conclusion could be drawn on the relative ageing properties of the two compounds. Another difficulty is to determine which of the standard tests, modulus, elongation, tensile or tensile product is the most significant. The tensile product was found to be the best criterion to use from the tests made. Due to the softening effect of the heat of the Geer oven the modulus figures of the oven tests and natural tests do not correlate. In the case of standard guanidine tread and carcass compounds it was found that the four and eight day periods in the Geer oven at 70 degrees C. correspond closely to one and two years of natural ageing.

Ageing of Typical Mechanical Goods Stocks. K. J. SOULE, *Manhattan Rubber Mfg. Company.*

A study has been made of the ageing of 30 typical mechanical goods stocks, comparing the changes in physical properties taking place during 1 year of shelf ageing, and that occurring in the oxygen bomb, and in the Geer oven. The 30 stocks have been separated into 3 groups, according to the degree of pigment loading, as follows: Lightly compounded—3 stocks; medium compounded—20 stocks; heavily compounded—7 stocks. The percentage change is given in tensile strength, elongation, tensile product, and modulus for each of the stocks after each type of ageing. The coefficient of correlation, a mathematical expression of the amount of agreement between the changes due to oven and bomb ageing and that caused by natural ageing, is given for each of the physical properties of each of the 3 classes of stocks. The data for the coefficients of correlation on the various physical properties does not show sufficient uniformity to warrant definite conclusions. There is no outstanding case of satisfactory correlation either for bomb or oven ageing for all 3 stocks, or for a majority of the physical properties studied. In other words, as far as this data is concerned, there is little to choose between the bomb and the oven as an approximation to natural ageing.

Artificial Ageing. W. W. VOGT, *Goodyear Tire & Rubber Company.*

In an extensive number of tests no correlation can be certain between any of the present artificial ageing tests and natural ageing nor has any attempt to arrive at a correlation coefficient between natural and accelerated ageing proved satisfactory. Investigations using a certain general type of compound have given good correlation with a particular test but have failed to show similar correlation when another accelerator is used. By using tensile strength as a criterion, good correlation might be obtained but the same stocks if compared on the basis of changes in modulus have shown poor correlation. The extreme variations in the data from these many tests lead to the conclusion that at the present state of the industry accelerated ageing can not be said to be a quantitative method. No single test can be expected to reproduce quantitatively all of the phenomena associated with natural ageing in the same degree on all physical properties and it is better to determine by independent tests the propensities of a stock with regard to oxidizability and after vulcanization. A slow oxidation test which has been found fairly certain consists in heating the sheets of rubber in oxygen at a pressure of 150 lbs. per sq. in. at 50 degrees C. for a period of about 6 days. If it comes out of the bomb with fair tensil properties it can be fairly assumed that the stock will not fail by oxidation. After vulcanization the rubber sheets are heated for 6 to 12 days in nitrogen at atmospheric pressure and at a temperature of 70 degrees C. from which test it can be judged whether a stock is becoming unduly short and brittle on natural ageing.

Service Ageing of Crepe Soles. A. A. SOMERVILLE, *R. T. Vanderbilt Company.*

The subject matter of my talk this evening is two pieces of rubber which have possibly been kicked and knocked about more than any rubber ever before brought before the attention of a meeting of rubber men, namely two unvulcanized crepe soles from a pair of golf shoes which passed their fifth year of service this spring, having covered in that time probably more than 500 rounds of golf. They were stubbed at the toes and worn off at the heels; they never saw a Geer oven nor a Bierer bomb but frequently after rainy Saturdays or Sundays they were put into a big gas heated dryer and kept there overnight at a temperature possibly as high as 140°F. at times. While there are no physical or chemical data available on the exact rubber from which those soles were cut five years or more ago, the soles themselves have gone through a fair ageing test; so last month they were pulled off the shoes and sent to the laboratory for examination. There a chemist got hold of them and compared their solubility with that of fresh pale crepe in acetone.

The acetone extract of the old crepe soles was darker than and nearly three times as great in volume as that of average fresh pale crepe. A mix was made comparing these old crepe soles with fresh crepe in a fairly heavily compounded stock and a range of cures was made, dumb-bell test pieces died out. The rate of cure you see is the same for both the new and the old rubber, but the old rubber gives a tensile about 20% lower.

Standardization of Truck Tires

The Department of Commerce has forwarded to manufacturers, distributors and users of industrial truck tires the recommendations for reducing the number and standardizing the sizes of truck tires, recently made by the Division of Simplified Practice after consultation with a committee of leaders in the industry. The recommendations will become effective September 1 next, representatives of the leading tire manufacturers having agreed to the proposed changes.

The principal changes will apply in the following dimensions which are given for width of tires and for nominal wheel diameters as standard for flat base tires.

Width of tire in inches	Nominal wheel diameters in inches					
*2½	*6					
3	6¼	12⅛	*14	16	20	
3½	*6	8	11¼	12⅛	*14	16
	*17¾	20	23½			
4	12⅛	*14	16			
*4½	*17¾					
5	*5	6½	11¼	12⅛	16	
	20	23½				
6	6¼	6½	*17¾			
7	20					

The dimensions given in the following table for width of tires and for nominal wheel diameters shall be standard for channel base tires:

Width of tire in inches	Nominal wheel diameters in inches		
3	20		
3½	12⅛	20	23½
5	12⅛	23½	

The manufacturers believe that the above channel base tires, and the sizes marked * can at some future time be eliminated from the list of standard sizes.

R. L. Lockwood, chief of the division of the simplified practice of the department, announced the appointment of a standing committee of tire and truck manufacturers to have general charge of the recommendations and to review adherence to the recommendation annually in the future.

Use of a Group of Performance Tests for Evaluating Rubber Compounds That Must Withstand Repeated Compression*

By HARLAN A. DEPEW AND E. G. SNYDER

Research Chemists, New Jersey Zinc Company, Palmerton, Pa.

Synopsis

Test methods for the evaluation of solid tire compounds are described in detail. They consist in preparing two test cylinders of rubber 5 inches in diameter and 3¾ inches high for each cure, and vulcanizing over a range of cures. One cylinder is tested by pounding with a force of 2,500 pounds three times per second and measuring the temperature rise. Test pieces are taken from the other cylinder and tested for abrasion resistance, tear resistance, and hardness. Accelerated aging tests are also conducted to determine the state and uniformity of cure.

Data is given comparing two solid tire compounds of different sulfur contents. The conclusions, although of interest, are secondary to the evidence that rubber testing has developed to a point where the laboratory can go a long way toward evaluating compounds for service.

CONSIDERABLE progress has been made during the past few years in the development of laboratory testing methods, and in the interpretation and application of existing test methods. At present it is possible to go a long way toward evaluating compounds for various conditions of service and this paper is presented to show what can be done through the use of a group of performance tests; one of which is a comparatively new test, in evaluating compounds that must withstand repeated compression.

The tests used consist of:

1. An aging test, chosen primarily to determine the state of cure and the uniformity of cure.
2. An abrasion test, in connection with a tear and a hardness test in order to understand it more fully.
3. A pounding test in which a large block of rubber is repeatedly pounded and the temperature rise noted.

In so far as the results are concerned, these tests are of minor interest individually, but of considerable value collectively. The first two are well known and will not be discussed. However, the pounding test will be described in detail since it is comparatively unknown.

The particular pounding machine described in this paper (See Figs. 1 and 2) is similar to, but somewhat more rugged than one used by the United States Rubber Company. A somewhat different device for repeatedly compressing smaller blocks has been described by Abbott.[1]

Procedure

A half dozen uncured rubber blocks, a little less than 5 inches in diameter and a little more than 3½ inches high, are prepared. Three of these blocks are made by rolling up a 3½-inch strip of rubber at the calender until the proper diameter is reached. The other three are made up by a more tedious procedure. Disks of rubber 1/10- and ¼-inch thick and 5 inches in diameter are cut from calendered sheet. These disks are talced and then built into a cylinder of the required size. For a mold, two ¼-inch plates are used with pieces of pipe 5 inches in inside diameter and 3¾ inches high. Two of the uncured rubber cylinders, one made by rolling and one by cutting out disks from the calendered sheet, are placed

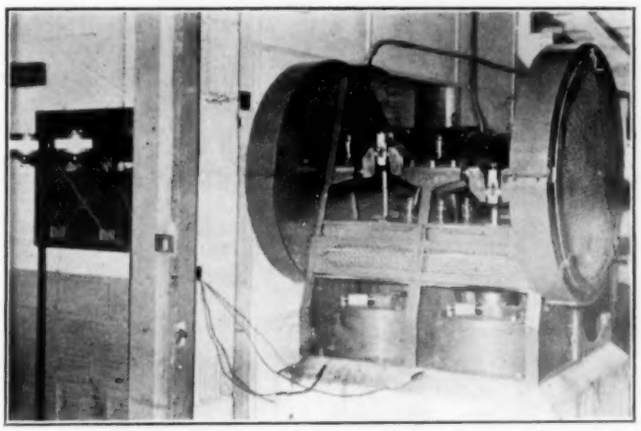


FIG. 1.—Pounding Machine with Test Cylinders in Place and Indicating Pyrometers Shown at the Left with Connecting Wires Leading to Thermocouples Embedded in the Centers of the Rubber Test Cylinders.

in the molds and a disk ¼-inch thick of hard rubber compound is placed on the bottom. Loose wadding is packed around the cylinders inside a wood frame so that air currents cannot affect them during cure. They are placed in a cold press and given a cure with a step rise as follows:

5 minutes to 104° C. 15 minutes at 104° C. 2 minutes to 113° C. 18 minutes at 113° C.	total temperature rise of one hour
20 minutes to 141.5° C.	
90 to 180 minutes at 141.5° C.	

The rate of cure of the compound is preferably chosen so that the time for the technical cure in addition to the one-hour rise will be in the neighborhood of 120 to 150 minutes.

After curing, the block made by plying up disks is pulled apart along the talced surfaces, giving test pieces 5 inches in diameter and 1/10- and ¼-inch thick, respectively. The 1/10-inch thick slabs are used for tear and tension tests, both before and after accelerated aging; some slabs being tested at once and others after aging 14 days at 70° C. The ¼-inch slabs are used for abrasion tests, and, if a hardness test is made by a ball penetration method, these slabs are used for this test also.

The Bierer-Davis oxygen bomb test is probably preferable to the Geer oven test for certain types of compounds, but for high-grade compounds, such as are used in this case, the results by the two tests have been in close agreement and the more easily operated oven test has been adopted. (It has been found that thick rubber objects age more uniformly in the bomb test but these slabs are sufficiently thin so that this consideration does not apply here.)

The other block, made by rolling directly from the calender, is tested on the pounding machine and the temperature rise noted by inserting thermocouples by the Ashman awl method.[2] In this method the end of the couple is threaded into the eye of the awl

[1] F. D. Abbot, "Machine for Testing Rubber Products Used to Absorb Vibration," *Industrial and Engineering Chemistry*, Vol. 20, No. 8, August 1, 1928, p. 853.

*This paper was presented at the Thirty-second Annual Meeting of the American Society for Testing Materials, held at Atlantic City, N. J., June 24 to 28, 1929.

[2] A. O. Ashman, "The Determination of Tire Temperatures," *Bulletin*, The New Jersey Zinc Company.

needle and the couple inserted into place and left behind as the awl is withdrawn.

It is essential in the use of a test machine such as the pounding machine that there should be at least a rough correlation between the results obtained by it and the results obtained in the corresponding service. The data given in Fig. 3 show that such a correlation is obtained by comparing tests on cylinders cut from tires (Fig. 4) with wheel tests on duplicate tires. Two points are clearly off the curve but the results are quite satisfactory when it is considered that the tire from which the cylinder was cut may not actually be an exact duplicate of the tire used for the tire test, in spite of the fact that the two tires are from the same lot, and that the difference in windage cooling that occurs in tire testing, due to the different non-skid designs, is not effective in the case of blocks tested on the pounding machine.

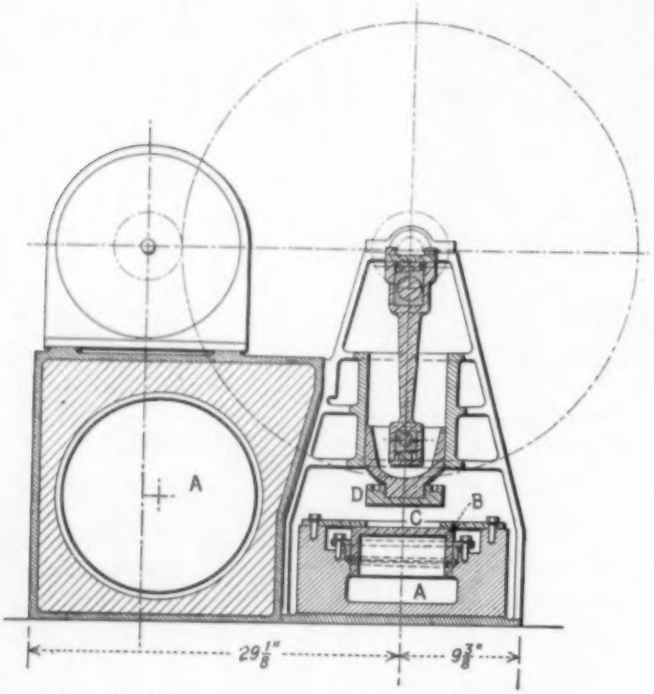
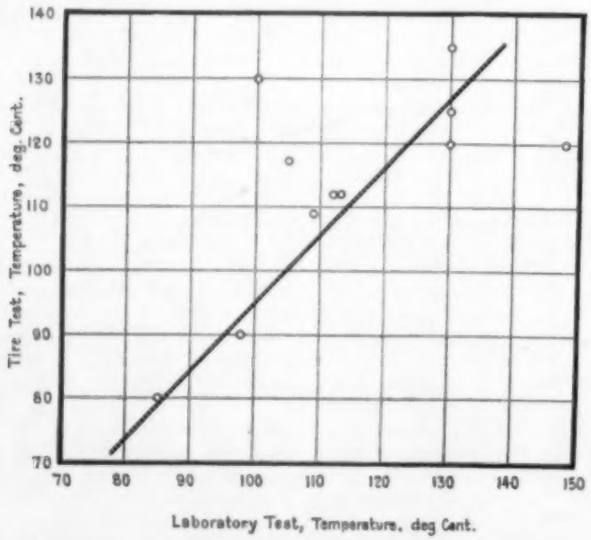


FIG. 2.—Showing Essentials of the Pounding Machine.

If the air pressure below the piston is 50 pounds per square inch, the force holding the block in place is 2,500 pounds, and the hammer cannot strike a blow in excess of this figure since the piston will depress.
A, reservoir and air chamber carrying 50 pounds of air.
B, piston with 50 square inches of area.
C, location of the test cylinder.
D, hammer that pounds the test cylinder.



Laboratory Test.—100 minutes, 2,500 pounds, 3 blows per second.
Tire Test.—180 minutes, 4,800 pounds, 10 miles per hour.

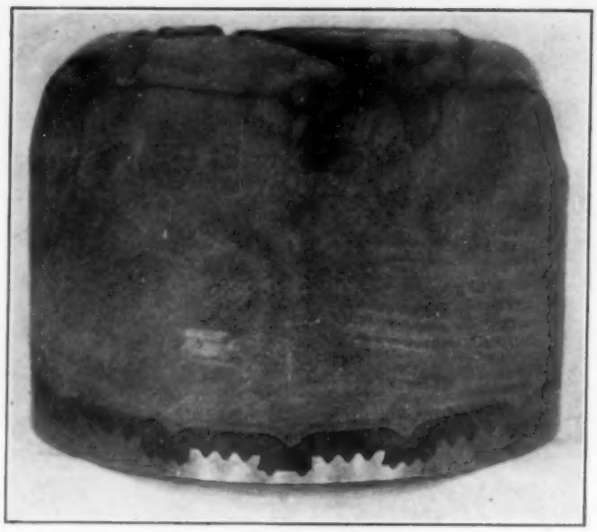


FIG. 4.—Test Cylinder from a Solid Tire.

Solid tires are cured in a mold surrounded by steam, whereas these test cylinders, which are cured in a press, are only heated from the ends and there is the consideration of possible heat loss from the sides of the cylinder. This is small, however, as shown by the fact that the air space around the molds was found to be at approximately the same temperature as the steam in the press. The tensile properties at various depths through the test cylinders are uniform, both before and after accelerated aging. The uniformity is as good as that obtained with solid tires.

TABLE I.—UNIFORMITY OF CURE IN A TEST CYLINDER AS SHOWN BY TENSION TESTS BEFORE AND AFTER AGING ON SLABS TAKEN AT DIFFERENT DEPTHS.

Compound used:	Parts By Weight	Parts By Volume
Pale Crepe	400	100
Smoked Sheet	400	
Sulfur	37	...
D. O. T. O.	9.5	...
Stearic Acid	2.3	...
Medium Pine Tar Oil	4.6	...
XX Red Zinc Oxide	1680	30
Carbon Black	87	5

Time of Cure at 141.5° C., minutes*	Depth into the Rubber Cylinders from Which Test Pieces are Removed, in.	Before Aging		After Aging 14 Days at 70° C.	
		Tensile Strength, lb. per sq. in.	Elongation, per cent	Tensile Strength, lb. per sq. in.	Elongation, per cent
120	0 to 0.5	3150	500	1485	350
	0.5 to 1.5	3225	523	1510	405
	1.5 to 2.0	3100	460	1585	410
	2.0 to 3.0	3000	500	1480	390
	3.0 to 3.5	2780	505	1405	325
150	0 to 0.5	2700	475	1125	240
	0.5 to 1.5	2910	515	1310	290
	1.5 to 2.0	2700	490	1300	275
	2.0 to 3.0	2620	480	1250	265
	3.0 to 3.5	2395	440	1090	180
180	0 to 0.5	2120	400	1000	130
	0.5 to 1.5	2205	430	1060	160
	1.5 to 2.0	2310	435	1075	155
	2.0 to 3.0	2145	410	1065	130
	3.0 to 3.5	2035	415	960	130
210	0 to 0.5	1800	440	865	145
	0.5 to 1.5	2055	430	985	150
	1.5 to 2.0	1810	430	985	150
	2.0 to 3.0	1910	440	1015	145
	3.0 to 3.5	1755	420	875	130

* The time given is in addition to the one-hour temperature rise.

Selection of Comparable Cures

In comparing compounds, it is necessary to make the comparison at comparable cures, and this involves the choice of a criterion of cure. The tensile optimum and the optimum area under the stress-strain curve are commonly used for this purpose. Another method is the amount of deterioration during accelerated aging. The decrease in tensile strength, per centage or absolute, is not entirely satisfactory since the tensile strength sometimes increases but the elongation, on the other hand, practically always decreases. After weighing the possibilities, elongation at break after aging was chosen and it was arbitrarily decided that the comparable cure would be that cure which showed an elongation at break of 300 per cent after fourteen days in the oven at 70° C. This elongation is the

TABLE II.—CHECK TESTS ON THE SAME COMPOUND MADE AT INTERVALS OF ABOUT A MONTH.

Compound used:	Parts By Weight	Parts By Volume
Pale Crepe	460	100
Smoked Sheet	460	
Sulfur	37	...
D. O. T. G	9.5	...
Stearic Acid	2.3	...
Medium Pine Tar Oil	4.6	...
XX Red Zinc Oxide	1680	30
Carbon Black	87	5

Date of Test	Time to Comparable Cure, minutes[a]	Tensile Strength lb. per sq. in.	Tensile Strength kg. per sq. cm.	Elongation, per cent	Loads at 300 per cent Elongation lb. per sq. in.	Loads at 300 per cent Elongation kg. per sq. cm.	Loads at 450 per cent Elongation lb. per sq. in.	Loads at 450 per cent Elongation kg. per sq. cm.	Relative Abrasion Resistance	Temperature of Block, deg. Cent.[b]	Compression of a Test Block Under 2500 lb. Load in.	Compression of a Test Block Under 2500 lb. Load cm.	After 14 Days Aging in Geer Oven at 70° C. Tensile Strength lb. per sq. in.	After 14 Days Aging in Geer Oven at 70° C. Tensile Strength kg. per sq. cm.	After 14 Days Aging in Geer Oven at 70° C. Elongation, per cent	After 14 Days Aging in Geer Oven at 70° C. Abrasion Resistance Units
Nov. 5, '28	138	2540	178	490	1345	94	2240	157	143	83	0.46	1.17	1245	87	300	108
Dec. 12, '28	138	2840	200	485	1455	102	2475	174	147	86	0.48	1.22	1330	94	300	114
Jan. 16, '29	144	2575	181	470	1585	111	2509	176	158	86	0.45	1.14	1365	95	300	117

[a] The comparable cure was the one that had an elongation of 300 per cent at break after 14 days at 70° C. This is a very arbitrary choice, but it works well for this class of compounds. The time given is in addition to the time of temperature rise.
[b] After pounding three times per second with a load of 2500 lb. for two hours.

TABLE III.—COMPARISON OF FOUR AND SEVEN-PER-CENT SULFUR COMPOUNDS AT THE COMPARABLE CURE

Compounds, Parts by Weight:	4 Per Cent Compound	7 Per Cent Compound
Pale Crepe	460	460
Smoked Sheet	460	460
Sulfur	37	64
D. O. T. G	9.5	6
Stearic Acid	2.3	2.3
Medium Pine Tar Oil	4.6	4.6
XX Red Zinc Oxide	840	840
Red Label Kadox	840	840
Carbon Black	87	87

Amount of Sulfur in Compound, per cent	Time of Comparable Cure, minutes	Tensile Strength lb. per sq. in.	Tensile Strength kg. per sq. cm.	Elongation, per cent	Load at 300 per cent Elongation lb. per sq. in.	Load at 300 per cent Elongation kg. per sq. cm.	Goodrich Tear Test, lb. per Inch of Thickness	Abrasion Resistance	Temperature of Blocks, deg. Cent.	Compression of Blocks in.	Compression of Blocks cm.	After 14 Days Aging in Geer Oven at 70° C. Tensile Strength lb. per sq. in.	After 14 Days Aging in Geer Oven at 70° C. Tensile Strength kg. per sq. cm.	After 14 Days Aging in Geer Oven at 70° C. Elongation, per cent	After 14 Days Aging in Geer Oven at 70° C. Abrasion Resistance
4	139	2910	204	505	1300	92	338	163	79	0.35	0.89	1445	102	300	139
7	134	3040	222	520	1365	96	380	165	75	0.38	0.97	1590	112	300	147

average value obtained on test pieces cut from commercial solid tires. An absolute figure for elongation at break after aging rather than a percentage decrease is justified by the fact that the type of compounds used for this service will have approximately the same initial elongation.

Using this criterion of cure, Table II gives data showing the reproducibility of three tests. These three mixes covered a period of two months and were good checks.

In studying solid tire compounds, a lot of four compounds, three unknowns and a standard, are usually investigated. The investigations have included a comparison of different rubbers, the influence of small amounts of softeners, a comparison of different zinc oxides and other pigments, and the influence of high and low sulfur contents, with results that have been in line with what experience would predict.

TABLE IV.—SHOWING INFLUENCE OF CURE ON AGING.

	Time of Cure at 141.5° C., minutes[a]	Before Aging Tensile Strength, lb. per sq. in.	Before Aging Elongation, per cent	Before Aging Tear Resistance	After Aging Tensile Strength, lb. per sq. in.	After Aging Elongation, per cent
4-per-cent Sulfur Compound	120	3145	535	383	1785	415
	150	2785	490	313	1240	220
	180	2575	480	281	1135	195
	210	2235	285	228	925	180
7-per-cent Sulfur Compound	120	3195	545	404	1855	360
	150	2865	495	309	1295	200
	180	1760	340	195	940	110
	210	1325	300	119	810	100

[a] The time given is in addition to the temperature rise.

TABLE V.—RATE OF HEATING OF BLOCKS ON THE POUNDING MACHINE OVER A RANGE OF CURES.

	Time of Cure at 141.5° C., minutes	Time of Pounding, minutes: 0	30	60	90	100	110	120	Compression of Blocks under 2500 lb. Load in.	Compression of Blocks under 2500 lb. Load cm.
		Temperature, deg. Cent.								
4-per-cent Sulfur Compound	120	29	50	62	75	78	81	82	0.39	0.97
	150	31	48	63	71	74	76	78	0.33	0.84
	180	21	50	63	78	81	83	85	0.35	0.89
	210	23	62	88	106	109	113	113	0.41	1.04
7-per-cent Sulfur Compound	120	20	53	67	75	76	78	79	0.41	1.04
	150	22	48	59	67	69	70	71	0.34	0.87
	180	22	50	66	72	72	73	74	0.26	0.66
	210	20	50	75	86	89	92	94	0.27	0.69

NOTE.—A high-sulfur compound hardens continually with progressive vulcanization whereas a low-sulfur compound, which cures faster in the early part of the cure, hardens at first and then softens due to the degrading influence of heat on the vulcanized rubber as it is formed. The point at which softening exceeds the hardening is spoken of as reversion, but this is a meaningless expression because the softening has been taking place from the beginning of the cure, the rate depending on the extent of the vulcanization and the temperature. Even a high sulfur compound which shows continual hardening with cure is less hard than it would have been if no degradation had occurred.

An Example of the Interpretation of the Results of the Tests—Collectively Considered

For the purpose of illustration, data on the influence of sulfur content using the three tests earlier referred to, are given in Table III. It is evident that at the comparable cures chosen, there is little choice between 4 and 7 per cent of sulfur, although there was an edge in favor of the 7 per cent sulfur compound.

One of the arguments for low sulfur contents is that a more uniform cure is obtained with thick objects, and that errors in the time and temperature of the cure will be less serious. It was found that with the long slow cure used, the uniformity of cure was as good with 7 per cent sulfur as with 4 per cent sulfur, but Table IV shows that the change in tensile properties over a range of cures was greater for the 7 per cent sulfur compound.

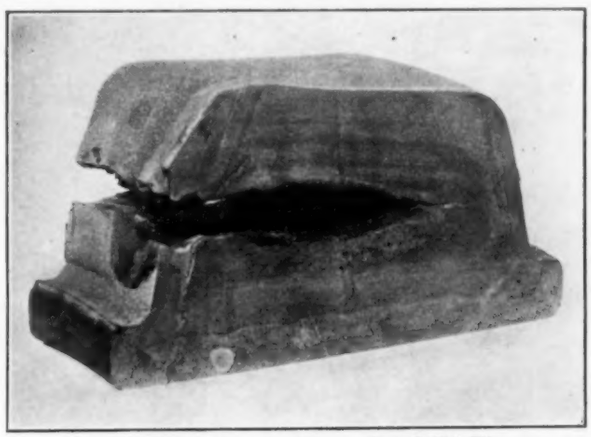


FIG. 5.—Example of a Blown-Out Solid Tire.

Accordingly, from the viewpoint of uniformity of cure and state of cure, there is no choice as to how much sulfur is used, but if the steam temperature around the mold is not properly maintained, the 7 per cent sulfur compound will be affected more than the 4 per cent compound.

In order to make the data on the subject of cure more complete, the temperatures attained by blocks of various cures under pounding is given in Table V. These data show that the 7 per cent sulfur compound consistently produced lower temperatures over a range of cures. The lower temperature for the high-sulfur compound was reasonable because the vulcanized rubber in this compound would be degraded less by the heat. The larger amount of soft degraded rubber with the low-sulfur compound allowed the test cylinder to compress more, thereby doing much work, and the poorer resiliency further increased the heat generation.

Comparatively little has been said about the tear tests because the tear resistance was about the same for the two sulfur contents, but this is a serious consideration in most comparisons. Cracks developing through the body of solid tires with great chunks of rubber tearing off is a major factor not to be neglected, as is shown by the casual observation of many tires in service.

From a consideration of the various factors involved in the above example of the application of the various tests to a study of the effect of sulfur content, it might be concluded that:

1. Low sulfur contents tend to minimize variability in cure due to materials or vulcanizing temperatures;
2. The sulfur content does not affect the uniformity of cure throughout the tire when sufficiently long cures are used; and
3. High sulfur contents tend to lower the temperature of the tire in service.

The conclusions drawn from the data presented are secondary, however, to the thought that such rubber testing methods have developed to a higher stage of usefulness than is generally admitted, and that it is possible to go a long way toward evaluating compounds for different conditions of service by the use of existing performance tests, with the possible addition of some other direct simple test that applies specifically to the product under development.

Butene

BUTENE, a new product of the Naugatuck Chemical Company, New York City, is a general purpose accelerator for rubber goods vulcanized in mold or in steam. It is a reaction product of butyl aldehyde and aniline and is a free flowing light amber colored liquid possessing no disagreeable odor. No toxic effect of any sort on factory workers has been observed from the use of this accelerator. It is said to accelerate well with the commonly used compounding ingredients and is adaptable to heavily loaded stocks, gum stocks and compounds high in reclaim rubber. It is also adaptable in stocks of any color. Rubber goods accelerated with Butene are characterized by high tensile strength and great resistance to tear, chipping and abrasion. The range of adaptability is shown in the fact that it may be used in thick rubber products such as shackle blocks, solid tires and rubber-covered rolls which may be cured at as low as 267° F. or used with satisfactory results in such goods as bicycle tires where the cure is made in a very short time at temperatures around 324° F.

The critical nature of Butene may be described by comparing with DOTG. It is claimed that given stock compounded with the proper amounts of Butene and DOTG, respectively, will give almost identical vulcanizing effect over a range of time in a mold at five pounds steam pressure. It is concluded therefore that Butent may be handled in the factory as easily as DOTG.

Samples of Butene are available from the manufacturers upon request.

SPDX—A New Accelerator

A NEW accelerator, named SPDX, has just been introduced by the C. P. Hall Company, Akron, O. While it is primarily intended for curing at 258 degrees Fahrenheit (20 pounds steam pressure), it is also effective over a range of considerably higher temperatures.

Chemically, SPDX is the metallic salt of a new complex organic compound. It is a finely divided, reddish-brown powder, having a specific gravity of about 1.60. It is stable under ordinary factory storage conditions, mills into rubber readily, and master-batches may be made carrying large quantities of the material without undue softening of the rubber. Under the usual proper factory conditions, SPDX has no toxic effect on the workers who handle it, according to the manufacturers.

SPDX is said to be efficient for all types of tire stocks, both tread and carcass, mechanicals, etc., but is not recommended for very light colored goods. It is not retarded by carbon black, clay, rosin or stearic acid. In fact, stearic acid is said to give somewhat stronger stocks, and when SPDX is used in a pure gum stock it is necessary to either combine *Phenex* (a higher temperature accelerator recently developed by the same company) with it or to add stearic acid. Where SPDX is used in a carbon black compounded stock, such as a typical tread, it is not necessary to use either *Phenex* or stearic acid, according to its producers. However, somewhat higher tensiles at break may be secured by the addition of either *Phenex* or stearic acid. SPDX stocks possess medium to high modulus, high tensile strengths, flat curing curves and good ageing properties.

Accelerator combinations sometimes prove themselves effective and tests have shown that SPDX when used with *Phenex* gives great economy, rapid cure and ease of handling. For compounds of the pure gum type, the C. P. Hall Company suggest a combination of half SPDX and half *Phenex*. This mixture is recommended for carcass stocks, not requiring stearic acid, and yielding stocks with good adhesion, elasticity and strength.

Rubber Reclaimers Association

AS a direct result of the recent action of the Rubber Manufacturers' Association in excluding reclaimed rubber manufacturers from their organization, the reclaimers have formed a trade association of their own under the corporate name of The Rubber Reclaimers' Association, Inc. The first meeting, which formulated the organization, was held in the offices of the U. S. Rubber Reclaiming Company, in the Grand Central Building, New York City, June 25.

The names of the charter members and the representatives of the respective firms who were present were as follows:

Akron Rubber Reclaiming Co., Barberton, O., William Welch; Appleton Rubber Co., Franklin, Mass., P. O. Lawton; Bloomingdale Rubber Co., Butler, N. J., Clark W. Harrison; Boston Woven Hose & Rubber Co., Cambridge, Mass., H. S. Royce; E. H. Clapp Rubber Co., Boston, Mass., J. S. Clapp; Hood Rubber Co., Watertown, Mass., R. B. Woodbury; Pequanoc Rubber Co., Butler, N. J., Joseph F. McLean; Philadelphia Rubber Works Co., Akron, O., J. S. Lowman; Rubber Regenerating Co., Naugatuck, Conn., E. A. Anderson; Somerset Rubber Reclaiming Works, New Brunswick, N. J., Irving Laurie; United States Rubber Reclaiming Co., Inc., Buffalo, N. Y., L. J. Plumb.

The following executive officers were elected: Clark W. Harrison, president; L. J. Plumb, vice-president; J. S. Lowman, secretary and treasurer.

The Executive Committee which consists of five members includes the above named executives together with J. S. Clapp and William Welch.

It is understood that a cordial invitation will be extended to all manufacturers of reclaimed rubber to join the Association, irrespective of whether they are subsidiaries of other companies doing a rubber goods manufacturing business or not.

For the time being the offices of the new Association will be maintained in the New York office of the Philadelphia Rubber Works Company, 52 Vanderbilt Avenue.

Progress With Synthetic Rubber

ACCORDING to the latest German reports, the synthetic rubber process of the I. G. Farbenindustrie is considerably more advanced than is generally realized. Tires made of synthetic rubber have been tried out on racing cars on the Nurnburgring track and have proved satisfactory, it is claimed. In order to make the test as complete as possible, cars have been fitted with two tires of synthetic rubber and two of natural rubber. Prolonged tests have been made at high speeds and it is claimed that the synthetic product has proved itself to possess wearing qualities equally as satisfactory as those of natural rubber.

But while from these reports it would seem evident the scientific difficulties in the manufacture of synthetic rubber have been successfully overcome, there still remains many commercial difficulties. According to the most reliable information, synthetic rubber would have to be sold at at least 75 cents per pound to yield a small profit. It obviously cannot, therefore, compete in any way at present with the natural product.

A basket of rubber flowers sent by Queen Mary to the recent Royal Ascot Ball at Windsor was auctioned for the benefit of the King Edward VII Hospital Fund, bringing a price of £100, or nearly $500. The basket, which was of silver, contained exquisite roses and sweet peas in perfect bloom.

RUBBER CHEMISTRY and Technology

Some Practical Methods of Measuring Gauge at the Calenders*

By E. O. DIETERICH

Manager, Physical Research Laboratory, The B. F. Goodrich Company

A LITTLE reflection will immediately establish the fact that it is necessary to control, in some manner, the thickness of practically every stock delivered by a calender, and that this control is indicated by the twin considerations of quality and cost. As an illustration, consider coated fabrics used for tire carcass construction. From the standpoint of quality the skim coat applied to the fabric during calendering must be of sufficient thickness to insure adequate insulation between the plies in the completed tire. Not only must the average thickness be more than a certain minimum but it must be uniform, for non-uniformity results in heavy gauge in some regions and light gauge in others, the latter being a fruitful source of failure by ply separation in service, on account of excessive stresses developed by loading and traction. On the other hand, a skim coat which is too heavy may actually lead to deterioration in quality by introducing defects caused by increased difficulty in tire building. Another example that may be cited is the tread slab, tubed or calendered. Light gauge here may result in incomplete filling of the mold, producing blemished tires; on the other hand, a tread slab that is too heavy may cause a more serious defect, buckled carcass, due to excessive rind at the mold register. In the case of solid tires, correct gauges are of utmost importance. And so one may instance an almost endless number of examples of the necessity of preserving quality by controlling gauge—in footwear, belting, hose and other mechanical products, rubber sheet for thread of all kinds, hard rubber compounds for panels, battery jars, etc.

On the side of production cost, excess gauge (beyond the requirements) may result in enormous losses. To illustrate: Let us consider a calender delivering material 54 inches wide at an average rate of 25 yards per minute for 24 hours, 300 days a year. (This is a conservative example for a calender in continuous operation in a large plant.) The annual output of this machine would be 16,200,000 square yards. Now, if carelessly or intentionally, the average gauge of this were only .001 inch greater than specified, the excess gum required would amount to 12,150 cubic feet, or, at a gravity of 1.0, about 760,000 pounds. If the material cost be taken at 50 cents per pound, then the loss in a single year would amount to $380,000. These are not insignificant figures; the manufacturer of rubber goods who in these days of strenuous competition does not literally "split hairs" at his calenders is imperilling his position in the industry.

The tremendous importance of controlling the gauge of calendered materials has aroused a lively interest among engineers and this has resulted in the development of a number of different types of control. The four most widely used in the rubber industry at the present time are illustrated in the figures below.

I. Hand Gauges. No rubber factory seems to be complete without hundreds of these, and, numerically, they outweigh all others in importance. Figure 1 shows the mechanism of one of the dial types, which include Ames, Randall-Stickney, Federal, etc. The material to be measured is placed between the foot, *A*, and an anvil, *B*. When the foot is in contact with the anvil both hands of the dial are in their respective zero positions. Raising the foot by means of the lever, *C*, to introduce the sheet to be measured actuates the gear train and causes both hands to rotate. The smaller hand makes one complete revolution for four revolutions of the large hand. As ordinarily used in the rubber industry, the smallest division indicated on the large dial is .001 inch, and on the small dial 0.1 inch. Different gear ratios and scales, of course, are used for various purposes.

The dial gauge must not be considered as a direct measuring instrument in the same sense as an ordinary linear scale. The linear movement of the foot is converted, by the train of gears, to an angular motion of the dial hand. The accuracy of the indications of an instrument of this sort is dependent upon the accuracy and uniformity with which the gears are cut. It is entirely possible that

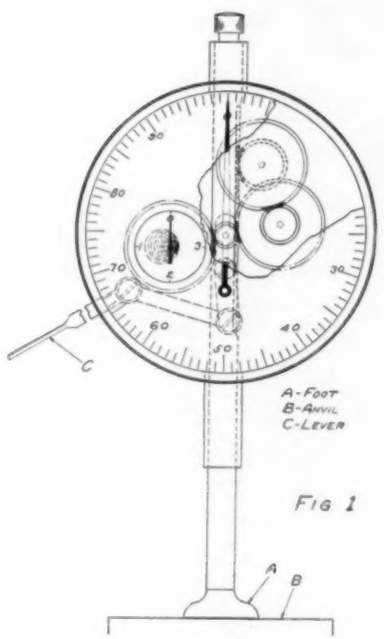


FIG 1

Dial Type Hand Gauge

the divisions in one part of the scale may not represent the same amount of travel as a corresponding number of divisions in another part, and for most accurate work the scale should be calibrated throughout, and precautions taken to avoid errors due to lost motion in the rack and pinion and gear train.

The chief sources of error in the use of this instrument are in the variations of foot pressure in different ranges of the scale and among different gauges, and in the compressible nature of the materials measured. At equal unit pressures the penetration of the foot into the sheet will be different for different stocks, and errors of considerable magnitude may result.

II. Mechanical Weighing Devices. The operation of these is based on the relationship between gauge and weight. For a homogeneous sheet of uniform thickness and width, the weight per unit length will depend upon the specific gravity of the stock, the thickness and width of the sheet. This type of instrument must,

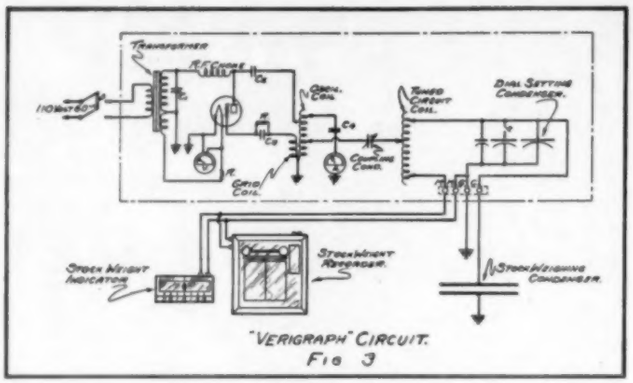
*Read before Meeting of Akron Group, Rubber Division, A. C. S., January 28, 1929.

therefore, be calibrated in terms of these factors. In practice, the width of the sheet is kept constant, as described later, and the instrument is used to indicate variations in thickness through the variations in the weight of a constant length of the sheet.

Any type of weighing device may be adapted, in this manner, to the control of gauge. When so used the load pan is replaced by a roller or plate to carry the material to be measured.

Figure 2 gives the essential details of the mechanism. The double roller assembly is mounted at each end on knife edges and adjusted to incline at an angle of a few degrees with the horizontal in the direction in which the web is traveling. One end is linked with the weight beam and the indicator. The rollers at the ends are spaced equidistant from the weighing roller and the three lie in the same horizontal plane. The material passes over and is supported by the three rollers. The center roller, it is observed, has an enlarged section at the middle. This serves to carry the central strip of the material, the edges being supported on plates at either side of the enlargement in the roller, making it possible to measure sheets of various widths without adjusting the scale. In operation the counterweight is set for the proper unit area weight on the beam and the indicator then reads zero, if the weight of the material delivered by the calender is correct. If it becomes too heavy, the double roller rotates counter-clockwise, as viewed from the scale beam, causing the hand of the indicator to move toward the side of the scale marked "over," if too light it rotates clockwise toward the region marked "under." The indicator scale may be calibrated to read in fractions of an ounce over- or under-weight. Electrical contacts may be provided to indicate by lights, or other means, when the limits of tolerances have been reached, or to operate control mechanism for adjusting the calender. A graphical record of the variations may be drawn by the indicator.

The success of this system of gauging material depends upon several factors. Of first importance is the accuracy of determining the relationship between gauge and weight. This calibration, for any stock, is derived by comparing the weight of a given yardage run to constant gauge with the readings of the indicator. Knowing the variation of weight with gauge it is then a simple matter, theoretically, to estimate the uniformity of production by the use of an instrument of this sort and to make it serve as control on calender operation. Another factor of great importance is the constancy of the tension on the sheet as it passes over the weighing rollers. This may be secured by providing compensating bars before the first and after the last roll which will maintain an even tension on the web at all times. One of the most aggravating sources of error in the use of this device is the presence of drafts in the calender rooms and these cannot be avoided unless the weighed portion of the web is shielded by an enclosure. The area presented to the air is very large and a slight downward draft will throw the indicator to "over" although the weight may be correct, while an upward draft under the same circumstances will cause the indicator to read "under." In certain operations, such as tread calendering or tubing, where the thickness is great and the width small, the latter error diminishes to negligible proportions.



Arrangement of Electric Circuits on "Radio" Gauge

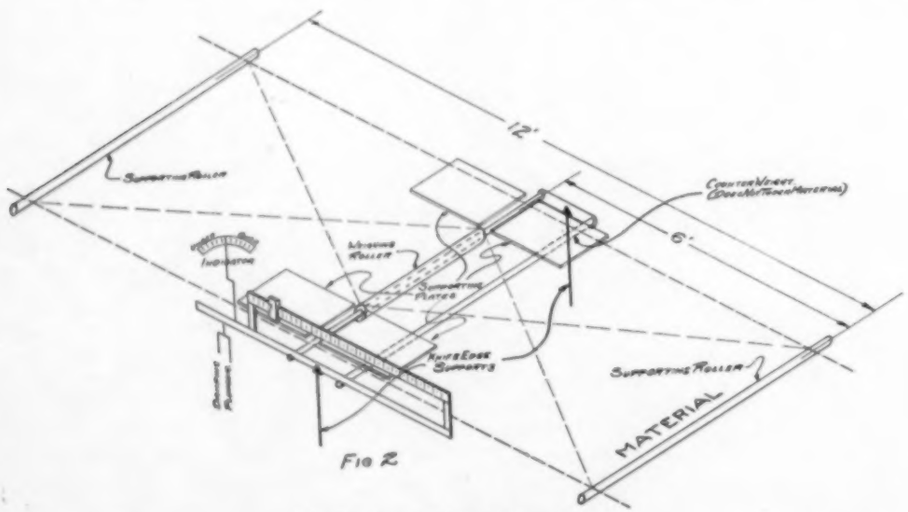
III. Instruments Depending upon Electrical Principles for Indication of Gauge. These are of two classes:

(a) The "radio" gauge which operates by changes in the electrostatic capacity of part of an electrical system.

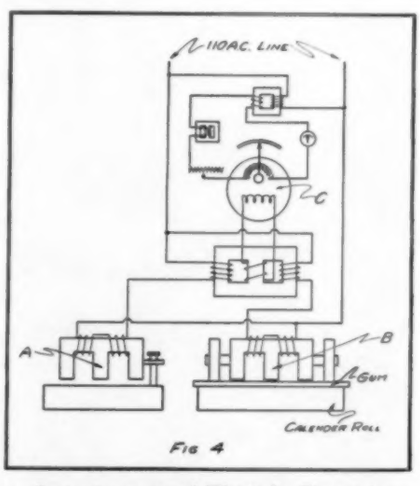
(b) The magnetic gauge, the operation of which is determined by changes in the reactance of a portion of an electrical circuit.

Both of these instruments are of recent development and application to the needs of the rubber industry. The radio gauge has been in successful use for a few years in the paper industry and has been introduced to the rubber industry during the last two years. The use of the magnetic gauge in the measurement of rubber is also a contemporary development.

Figure 3 is a diagram of the electrical circuits involved in the radio gauge. The condenser, between the plates of which the material to be gauged passes, forms part of a tuneable circuit which is inductively coupled to another circuit oscillating at about 500,000 cycles per second. The amount of current passed through the former circuit depends upon its capacity, inductance and resistance. If the latter two are kept constant and the capacity varied, a typical resonance curve is obtained the area and steepness of which are largely modified by the resistance. The steepness of the resonance curve determines the sensitiveness of the arrangment, a sharply rising curve indicating that small changes in capacity produce large changes in the current which is measured by a milliammeter used as an indicator. This method of gauging depends on the modification of the capacity of the measuring condenser by the materials passing through it. The capacity of a parallel plate condenser, such as this, is determined by the area of the plates, the distance between them and the dielectric constant of the medium separating them. The first two are maintained constant and the dielectric varied in this instrument. The space between the plates is about one-half



Mechanism of Weighing Device



Arrangement of Electric Currents on Magnetic Gauge

inch. Air has a specific inductive capacity of 1, while for rubber and fabric this constant varies from about 2.5 to 4.0. Thus, when part of the air is displaced by a web of rubber the capacity of the condenser is increased. As the rubber varies in thickness, or in weight, so will the capacity, increasing with increasing thickness and decreasing as the thickness or weight diminishes. This change in capacity is reflected in the variation of the current passed through the circuit and registered by the indicator.

In practice, the electrical characteristics of the measuring circuit are chosen so that a satisfactory sensitiveness is obtained, and the indicator reads zero when a web of the proper thickness lies between the plates. Any deviations from the standard thickness are then registered by the indicator, and may be permanently recorded by an autographic recorder connected in parallel with the indicator and the chart used as a check on calender operations.

The operation of this instrument depends upon the correspondence between the thickness of the material and the dielectric effect. Since the weight of a constant area of a sheet of uniform thickness is directly proportional to the thickness, this instrument is frequently referred to as a weight-meter, and calibration is affected by weighing known yardages of material run to a constant indicator reading.

In use a number of factors must be taken into consideration in order to insure satisfactory results. It is just as necessary here as it is in the case of mechanical scales to keep the tension on the web constant and the web parallel to the plates. Sticking of the gum to the plates must be avoided. Temperature changes will affect the separation of the plates unless compensation is provided. The manufacturers of this instrument have resorted to the use of invar for the bracket supporting the condenser plates. Line voltage changes must be without effect upon the indicator, so a voltage regulator is included in the circuit. Tube characteristics must remain constant and matched tubes are used to avoid recalibration each time a tube is replaced in the indicating circuit.

The fourth type, the magnetic gauge, as the name indicates, converts changes in thickness into magnetic effects in an electrical circuit. Figure 4 shows the arrangement of the electrical circuits. Briefly, they consist of two balanced circuits, properly adjusted regarding phase difference and power factor, one of which is maintained constant, the "master" circuit (Figure 4, A), and variations in the other (Figure 4, B) are measured by an ammeter (Figure 4, C), acting as an indicator and recorder. The measuring magnet is mounted on a carriage, riding upon the gum on the calender or idler roll, and uses the roll as an armature. When the distance between the calender roll and the magnet is the same as that between the "master" magnet and its armature the indicator reads zero. When this distance changes, the magnetic flux, and, hence, the reactance of the measuring circuit is affected and the indicator reads over- or under-gauge, depending on whether the magnet moves farther from or closer to the roll. The indicator scale may be calibrated to read directly in thousandths of an inch.

Calibration of this instrument is effected by introducing measured thicknesses of non-magnetic material between the magnet and the roll and noting the reading of the setting device when the indicator reads zero. The setting device scale may read either arbitrary divisions or be divided to indicate, directly, chosen fractions of an inch.

The accuracy of the indications of this device, as in the others, is influenced partly by the material being gauged and partly by the instrument itself. Temperature changes of the carriage require compensation, and here, again, invar is used. Line voltage fluctuations have their effect and voltage regulation is required. The softness of the stock determines the extent to which the carriage wheels sink into the sheet. Sulphur deposits collecting on the carriage wheels must be removed before they become heavy enough to affect the readings appreciably.

In a general way, the descriptions above cover the fundamental principles underlying the instruments most commonly used in gauging calendered stock and indicate the features in which the various devices excel and in which respects they are unsatisfactory. With the exception of the hand gauge all the instruments are independent of the personal equation. They are sufficiently sensitive and quick in response. All of them may easily be modified to include control of the calender. But considerable improvement is still necessary before the ideal is reached. What is required is an instrument of adequate sensitiveness, so that important variations in gauge may be indicated and controlled. It should be unaffected by external influences such as temperature, humidity, pressure, etc. The physical characteristics of the material measured should be without effect; *i.e.*, its indications must be accurate. Its range of measurement should be large enough to include all the stocks for which gauge control is necessary. Mechanical simplicity, and portability are desirable, ruggedness is imperative. The original cost and maintenance expense should be moderate in order to allow of wide application. These are problems for the mechanical and the electrical engineer. The rubber manufacturer, on his part, can contribute to greater uniformity and economy by thorough study of the materials to be calendered and of machine operation. Progress in these directions is greatly desired.

Whether a single universal instrument can be designed is questionable. There is a strong tendency in the direction of subordinating overall gauge in some operations and relying mainly on square yard weight. In other cases gauge apparently must remain the sole factor governing the operation, so it now appears that the field may later be divided among two types of instruments, one an accurate weighing device, the other an accurate thickness measuring device.

BOOK REVIEWS

BETTERING PRODUCTION METHODS THROUGH RESEARCH. Published by the Policyholders Service Bureau of the Metropolitan Life Insurance Company, New York City. 1929.

In New England, many manufacturers have discovered that intensive research is essential to the proper selection and development of equipment and to the maintenance of production practices which will enable them to compete successfully on a profit-making basis. The ninth and last report in A Study of Better Business Through Research in New England Industry, this compilation of actual cases, grouped according to industry, shows how fact-finding has been employed to improve production methods.

FACTS AND FIGURES OF THE AUTOMOBILE INDUSTRY. 1929 Edition. Published by the National Automobile Chamber of Commerce, 366 Madison Avenue, New York City. 96 pp.

Because of its usual accuracy and comprehensiveness, this annual summary of all important data relating to the automotive industry has come to hold a place of its own as an invaluable reference work. This year's edition contains several new tables and charts which are of importance to all who are associated in any way with the production or equipment of automobiles.

INDUSTRIAL STANDARDIZATION. Published by the National Industrial Conference Board, Inc., 247 Park Avenue, New York City. 1929. 320 pp.

While an old and universal idea, the principle of standardization has never been so intensively applied as in our modern machine age, of which it has become a fundamental characteristic. The many economic advantages and disadvantages of standardization in industry are discussed in this volume, which gives in a comprehensive way a clear, non-technical picture of the issues involved in adopting such practices.

A PICTURE OF WORLD ECONOMIC CONDITIONS AT THE BEGINNING OF 1929. Published by the National Industrial Conference Board, Inc., 247 Park Avenue, New York City. April, 1929. 268 pp.

Individual reviews of the outstanding facts of industrial production, foreign trade, employment, government finance, prices and cost of living in twenty-two countries are contained in this volume, the second of a series. The correspondents of the National Industrial Conference Board in foreign countries include many outstanding men in their industries.

INTERNATIONAL INDUSTRIAL STATISTICS AS AN AID TO WORLD PROGRESS. By Magnus W. Alexander. Published by the National Industrial Conference Board, Inc., New York City. July, 1929. 20 pp.

The need for accurate information about trade conditions has forced the development of governmental agencies and co-operative associations to compile industrial statistics. Little, however, has been done in regard to collating and exchanging such data between the nations of the world, and in this paper, a reprint of Mr. Johnson's address at the Fifth General Congress of the International Chamber of Commerce at Amsterdam on July 9, states the case for such work as a means toward a better international economic balance.

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EDITORIAL COMMENT

International Industrial Statistics

FEW industries in the world depend so vitally on statistical data as the rubber industry. Statistics of the production and shipments of crude rubber are important factors in the fluctuations in the rubber markets. The number of tires produced, dealers stocks, inventories of raw materials and unit sales figures are all important statistics in the determination of production schedules. There is probably nothing that would tend to definitely stabilize the crude rubber market more than prompt and accurate statistics. While the industry has gone far in establishing statistical services through the Rubber Manufacturers' Association and the agencies of the government, there is still much to be done along these lines. In the crude rubber field, production figures from several producing areas are slow to be published. Accurate figures on native production are still unobtainable until too late to be useful. In the manufacturing industry further progress will have been made within the next few months with the establishment of stock surveys of rubber footwear, but international figures on production of rubber goods are lacking.

Recently the International Chamber of Commerce established a committee on industrial statistics which should do a great deal along these lines. With national sub-committees in the various countries, a basis has been laid down for constructive work with unlimited possibilities for assisting in the stabilization and orderly development of industry and trade throughout the world. Besides the committee on international statistics of the International Chamber of Commerce, other agencies, notably the League of Nations and the International Statistical Institute at the Hague, are equipped to aid in the effort.

The Reclaimers' Association

THE recent reorganization of the Rubber Manufacturers' Association to the exclusion of the reclaimers has now resulted in the organization a separate trade association by the latter. There should be no conflict between the two associations, each has a wide and distinct field to serve and doubtlessly some close form of cooperation between the two will be worked out. The establishment of two separate associations serving these two distinct phases of the industry would appear to be, at first glance, an excellent thing for the industry as a whole. Moreover there is as much reason why the reclaimers of the United States should organize as the planters of crude rubber of Great Britain and Holland. Each has a service to render among their members and an interest to protect. In the old association a number of the larger reclaimers were not members and did not participate in reporting their trade statistics to the association. As a consequence it was persistently claimed that there was a wide element of error in the association's reclaimed statistics which sometimes proved an injustice to reclaimed rubber. The new Reclaimers Association now embraces practically all reclaimers in the trade. It has not been announced just how far the new association will go in maintaining a separate statistical service on reclaimed rubber or whether it will continue to leave the dissemination of such information in the hands of the Rubber Manufacturers' Association. It would seem, however, that this is a question which could be well studied by the new organization in the interest of their own particular phase of the rubber industry in general.

Plantation Costs

CONSIDERABLE agitation is reported among British rubber plantation companies in connection with the publication of production costs and several of the companies have announced that they will omit these figures in future financial statements and annual reports. The explanation given for this omission comes in one case from the Malacca Rubber Plantations, Ltd., and is to the effect that cost figures of the individual companies are worked out on such varying and conflicting bases that there was no uniform "yardstick" for comparative purposes. Doubtless this is true and the published costs have been unfair to the companies in many cases. In fact, inversely, they have often been a source of embarrassment to the companies. It was not easy to publish a low production cost and pay a fat dividend, and at the same time complain bitterly at the machinations of the "American pool," for instance, or the bearish activities in the New York rubber market. In the withholding of these cost figures there is another angle to consider, namely, the inference which will be given to this silence in rubber trading circles. The plantation industry must not feel offended, therefore, if general statements that rubber is selling at little or no profit, are not taken seriously.

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NATIONAL N QUALITY

NEWS of the INDUSTRY

Financial—Business
Building Operations
Personals
New Products

LAMBERTVILLE RUBBER RESUMING OPERATIONS

The plant of the Lambertville Rubber Company, Lambertville, N J., has been reopened and is now turning out rubber boots and shoes after having been closed for several months. Dr. Peter Fireman, president of the Magnetic Pigment Company, Trenton, N. J., recently purchased the factory, which was held at $400,000.

Joseph T. Crowley and William E. Crowley have been appointed department heads in the new company. The original company was established in 1860 and for many years was a leading manufacturer of boots, rubber bands and toys.

FIRESTONE WORKERS AT TENTH ANNUAL OUTING

Approximately 8,000 employes and members of their families were present at the tenth annual picnic for Plant No. 2 of the Firestone Tire & Rubber Company, held last month at Meyer's Lake Park, Canton, O. Special trains, buses and automobiles brought the huge crowd from Akron to the outing grounds.

Free tickets provided entrance to all amusements and everything in the park was turned over to the enjoyment of the Akron guests. Baseball, swimming, dancing and contests of every description featured the day.

SCRAP RUBBER RATES TO GADSDEN, ALABAMA

Southern Freight Association Submittal No. 44687 proposes to establish the following rates on scrap rubber to Gadsden, Ala., where the new tire, tube and reclaim plants of the Goodyear Tire & Rubber Company are located: from Louisville, Ky., 37c; Memphis, Tenn., 33c; Nashville, Tenn., 30c; Cincinnati, O., Evansville, Ind., 37c; St. Louis, Mo., 44c; Gulfport, Miss., New Orleans, La., 37c; Mobile, Ala., Pensacola, Fla., 33c; Vicksburg, Miss., 34c; Charleston, S. C., 37c; Savannah, Ga., Brunswick, Ga., 36c; Jacksonville, Fla., 38c; Atlanta, Ga., 26c; Birmingham, Ala., 17c; Chattanooga, Tenn., 22c; Montgomery, Ala., Selma, Ala., 27c; Knoxville, Tenn., 29c; and from Macon, Ga., 30c per 100 pounds. Submittal No. 45167 proposes a reduction in the rate on scrap rubber from Wilson, N. C., to Oaks, Pa., from 53c to 43½c per 100 pounds, subject to a minimum weight of 40,000 pounds.

Western Trunk Line Docket No. 2917A proposes to establish the following rates on scrap rubber, carloads, from Mankato, Minn., to Akron, Barberton, Brittain, and East Akron, O., 42½c, and to Buffalo, N. Y., and Erie, Pa., 46c.

Test Reaction of Motor Bus To Blowout at High Speed

Officials of the White Motor Company conducted a series of tests last month on the Richmond Road, Beechwood, O., to determine whether a loaded motor bus could hold the road after a tire blowout while traveling at about 60 miles an hour. A standard bus type chassis, loaded with metal weights to equal the weight of about 40 passengers, was driven by Lee Daniels, a tester, up to a speed of 57 miles an hour when, without warning, a double barrelled shotgun, attached to the chassis, was discharged into the right front tire. In the 200 yards necessary to bring the big bus to a stop, no sign of wobble or swerving was noticed.

"What we are trying to prove," said H. D. Church, director of engineering, "is that there is no danger when a tire blows if the driver pays normal attention to his business. The tire is flat after it has gone about ten feet from the place it is shot, but the bus won't be ditched if the driver is normally careful." Four tests were made with different weights and makes of tires, with results practically identical.

U. S. RUBBER COMPANY SEEKS OLDEST DEALER

The United States Rubber Company has been conducting a search to find out who is the oldest tire dealer in the country. Unless something new comes to light, the honor seems to belong to John Roth, of the Roth Cadillac Company of Erie, Pa.

Mr. Roth has been selling tires since 1892, when he stocked his first bicycle tires, and continued to handle the bicycle tire line until 1907. In 1898 he entered the automobile field with a car now obsolete and forgotten, and at the same time began to sell automobile tires. He became distributor for Cadillac in 1903 and has sold the Cadillac continuously since that time. He has been handling United States tires for 37 years.

The second oldest dealer appears to be Frank Shaw of 1421 Brown street, Philadelphia. He started handling Hartford bicycle tires—made by a U. S. subsidiary—in 1894. He was the first man in Philadelphia to sell and repair automobile tires. He has been selling U. S. Tires ever since.

CALIFORNIA FIRESTONE WILL INCREASE OUTPUT

The Firestone Tire & Rubber Company of California has scheduled a production of 3,000,000 tires for 1930, an increase of 350 per cent over its first year's output, according to R. J. Cope, vice-president and general manager. The present output is 5,000 tires and 7,000 tubes daily, a gain of 100 per cent over the production rate of six months ago.

Recent expansion plans, which will double the plant's size and capacity, will give Firestone by the end of 1929 a daily production of 12,500 tires and 15,000 tubes, with an annual payroll of about $5,500,000. Both domestic and export trade served by the Los Angeles factory will be increased, and in the United States all western points that can be reached at lower freight rates than obtain from Akron will be covered. Export trade throughout the Pacific area also will be handled almost entirely from Los Angeles with the exception of British possessions which are nearer the Canadian plant and can be served more advantageously from there.

CARRIER ENGINEERING OPENS DETROIT OFFICE

The Carrier Engineering Corporation, specialists in air conditioning, with main offices and laboratories in Newark, N. J., has announced the opening of a permanent engineering and sales office in the Buhl Building in Detroit, under the direction of Mr. Herbert Peacock.

The company has maintained temporary engineering offices in Detroit during the past year and on previous occasions for the purpost of supervising the construction of extensive air conditioning, cooling and ventilating systems in the Parke Davis Laboratories and in the department stores of The J. L. Hudson Company and the Newcomb-Endicott Company.

Air conditioning work in Detroit and vicinity has, up to this time, been handled by the Chicago office of the company. The growing demand for air conditioning in public buildings in this territory has invited the opening of the new office.

Mr. Peacock leaves his position as engineering assistant to the sales manager of the company to take charge of this territory.

50,000 Goodrich Tires a Day

The B. F. Goodrich Company is now averaging about 50,000 casings daily, the highest output in the history of the company, according to a statement released June 20. President James D. Tew declares that he looks forward to a very busy second half of the present year.

GOODYEAR WILL GRANT REBATES TO RETAILERS

In an effort to stimulate the sale of tires during the dullest period of the year, the Goodyear Tire & Rubber Company has announced that it would grant a discount of 2½ per cent from present list prices on all passenger car casings and tubes with the exception of bus sizes. The discount applies only to dealers and covers shipments ordered between May 1 and October 1 of this year.

The 2½ per cent discount is payable next December in merchandise credit, and according to information given to members of the Rubber Exchange, other large tire manufacturers plan to follow Goodyear's action. No reduction from present list prices on casings and tubes to the public is contemplated, it was stated by executives of the manufacturing companies yesterday.

It was also learned that the discount approximately covers delivery charges to the dealers, enabling the latter to compete more favorably with mail order tires.

RUBBER SERVICE SALE TO MONSANTO RATIFIED

Edgar M. Queeny, president of the Monsanto Chemical Works, St. Louis, Mo., announced on June 27 that the stockholders of the Rubber Service Laboratories Company, Akron, O., have ratified the action of its board of directors, which provided for the acquisition by Monsanto of the entire assets of that company.

The deal was accomplished through an exchange of stock, Monsanto issuing stock in the Monsanto Chemical Works in exchange for the entire assets and good will of the Rubber Service Laboratories Company and its subsidiary, the Elko Chemical Company, the assets of the acquired companies being $1,500,000.

James O'Sullivan

James O'Sullivan, founder and former president of the O'Sullivan Rubber Heel Company, died at his home at Lowell, Mass., on June 21 after a brief illness. He was 83 years of age.

Born in Skibereen, County Cork, Ireland, in November, 1847, the son of Timothy and Catherine O'Sullivan, he came to this country in 1866, settling in Lowell. In 1875 he purchased the retail shoe business of Frank Brady and conducted it alone until he was joined by his younger brother, Humphrey, two years later, when the partnership of O'Sullivan Brothers was formed.

The shoe business was successful and in 1893 the brothers entered the clothing business. The next year the O'Sullivan rubber heel was devised, and in 1899 the brothers organized the O'Sullivan Rubber Heel Company. James O'Sullivan was president until 1911, when the enterprise was purchased by the J. P. Morgan interests. It is now carried on under the name of the O'Sullivan Rubber Company, Inc.

Mr. O'Sullivan was long actively interested in political, civic, religious and fraternal affairs, holding membership in numerous organizations. He is survived by his brother, Humphrey, three sons and four daughters.

Oliver Ames

Oliver Ames, senior member of the board of directors of the General Electric Company, died at his home in North Easton, Mass., on June 18. Mr. Ames, 65 years old, had been a director since 1893, being elected at that time to fill the vacancy caused by the death of his father.

James W. Dashiell, formerly Minneapolis manager of the Eureka Fire Hose Manufacturing Company, died June 3 at the age of 55. He had served as manager nine years.

Schrader District Managers Confer

DISTRICT sales managers of A. Schrader's Sons, Inc., manufacturer of tire valves, valve parts and pressure gauges, met last month for a conference at the company's plant in Brooklyn, N. Y. Those shown in the back row, from left to right, are A. E. Fay, manager Chicago branch; P. L. Mitchell, manager dealers' relations; M. H. Tisne, manager manufacturers' accessory sales; W. R. Cisney, manager eastern district; A. G. Underwood, manager accessories sales; and R. L. deBrauwere, general sales manager.

Those in the front row, from left to right, are S. A. Howell, manager Toronto branch; M. C. Stevens, manager Akron branch; J. Hoerger, manager Los Angeles branch; W. J. Kirkpatrick, manager service department; and R. W. Davis, manager Detroit office.

GARLOCK PACKING EARNS $321,196 IN FOUR MONTHS

In the first four months of 1929, the Garlock Packing Company, Palmyra, N. Y., makers of rubber and other mechanical packings, earned $321,196 after all charges, non-recurring organization expenses and federal taxes, according to an announcement by George L. Abbott, president of the firm. The company's common stock has been selling actively on the New York Curb Exchange since its listing early this year.

Due to reorganization and consolidation of a subsidiary, 1929 earnings are not directly comparable with previous years, but for the first four months of this year, both sales and earnings were approximately 20 per cent over those of the corresponding 1928 period. Sales were the largest in any corresponding period in the company's history.

Samson Starts Dividends

The Samson Tire & Rubber Company has declared an initial dividend of 31¼ cents on the common stock, payable August 1 to stock of record July 15. This rate of payment, if continued quarterly, would put the stock on annual basis of $1.25. The company is now earning about $3.50 a share annually, but A. Schleicher, president, was reported a month ago as saying that the board of directors was not considering the inauguration of dividends.

National Rubber Machinery

The National Rubber Machinery Company has declared a quarterly dividend of 50 cents, payable July 15 to stock of record July 1. The last dividend was paid April 15.

Action of Stocks is Mixed

Goodyear, Goodrich, and U. S. Rubber made gains during the past fortnight on the New York Stock Exchange, but new lows for the current year or longer were made by six other securities, including Norwalk, Fisk preferred, Kelly Springfield 6 per cent preferred, and Miller. Dunlop Rubber gained sharply on the London exchange after Sir Eric Geddes denied that there would be a new issue at a low price.

Late Stock Prices

	Last Price		High	Low
	July 2	June 17	—1929—	
Ajax	6	5½	11¼	4½
Falls	5	5¼	11⅜	5
Faultless	32	—	39⅞	32½
Firestone	270	273	309	220⅛
do. 6% pfd.	110	109¾	111	108
Fisk	8½	8¾	20⅛	7⅝
do. 1st pfd.	43½	49	72½	40¼
General	280	280	298	236
do. pfd.	95	96	102	95
Goodrich	81¾	80⅞	105⅝	73
do. pfd.	112	111¼	115¼	111
Goodyear Com.	129½	123⅝	154½	112
do. pr. pfd.	101	101⅜	104⅞	101
Hood	19¼	19⅞	27¼	18¼
India	51	54	73	39
Intercontinental	8⅝	9	14¼	8⅛
Kelly Springfield	15½	15¼	24	11
do. 1st pfd.	75	74	100	75
Lee	14⅛	16	25	10
Miller	18	20	28¾	18
do. pfd.	62	64	83	62
Mohawk	44	48	66	50
do. pfd.	81	—	90½	81
Norwalk	2¾	3	6⅛	2¾
Seiberling	39	41	65	39
do. pfd.	104	—	107⅞	104
U. S. Rubber	52¼	52	65	42
do. pfd.	80⅜	78	92½	73

Names in the News

CHARLES W. SEIBERLING, vice-president of the Seiberling Rubber Company, was the principal speaker at the meeting of the Akron Real Estate Board, held at the Young Women's Christian Association building on June 10.

C. E. STEBBINS, of department 110-X, Goodyear Tire & Rubber Company, has been awarded a prize of $340 for a suggestion on a machine improvement in his division of the Akron factory.

HARVEY S. FIRESTONE, president of the Firestone Tire & Rubber Company, met with a group of members of the Ohio Senate and House of Representatives on June 18 for the purpose of discussing negotiations for the purchase of the birthplace of THOMAS A. EDISON, noted inventor and rubber experimenter, at Milan, O.

HORACE B. TOBIN, president of the Woven Steel Hose & Rubber Company, Trenton, N. J., has sailed with his family for a lengthy tour of Europe.

ABRAHAM H. SAWYER has resigned as general manager of the Vulcanized Rubber Company, Morrisville, Pa., after having been affiliated with that concern for many years. He has not as yet announced his plans for the future beyond the fact that he will shortly leave for an intensive tour of the chief European countries.

BRUCE BEDFORD, CHARLES E. STOKES, A. BOYD CORNELL, CLIFFORD H. OAKLEY and GENERAL C. EDWARD MURRAY, prominent Trenton, N. J., rubber manufacturers, have been appointed to the manufacturers' committee that is arranging a display for the 250th anniversary of the settlement of Trenton. The rubber manufacturers will display their goods at the Second Regiment Armory during the celebration in the fall.

GEORGE HALDEMAN, air pilot, was a visitor to Akron airport June 20, making a brief stop-over of less than an hour, during which he was greeted by representatives of the Goodyear Tire & Rubber Company.

B. M. ROBINSON, assistant secretary of the Firestone Tire & Rubber Company, was the principal speaker at the annual safety rally of the industrial safety committee of the Akron Chamber of Commerce on June 20.

J. L. FITZGERALD has joined the Premier Rubber Manufacturing Company, Dayton, O., as chief chemist in charge of the new laboratory which the company recently installed.

JOHN MARSHALL, mayor of Cleveland, headed a delegation of representatives of that city who flew to Washington last month in the Firestone Tire & Rubber Company's new airplane to invite PRESIDENT HOOVER to the national air races at Cleveland on August 25.

PAUL COSTE APPOINTED U. S. FLOORING MANAGER

Paul Coste has been appointed as manager of the flooring department of the United States Rubber Company sundries department, according to an announcement just made by Charles A. Blake, general sales manager of the sundries department. Mr. Coste comes to the U. S. Rubber organization from the Goodyear Tire & Rubber Company at Akron, where he was promoted only a few months ago to the post of manager of flooring and tile sales. He had previously been handling the sales of these

PAUL COSTE

products, but last March was placed in charge of a separate department created by Goodyear to handle such work.

Born in St. Louis, Mo., in 1893, Mr. Coste was educated at Washington University, where he completed a course in mechanical engineering in 1914. He started in business with the Liquid Carbonic Company, Chicago, Ill., in sales work, and two years later he was employed by the American Steel Foundries, also of Chicago. During the war he served as an ensign in the United States Navy.

H. L. FLOOD, manager of the Springfield, Ill., district for the Fisk Rubber Company, spoke before a meeting of 50 Fisk tire dealers in the central Illinois territory in the St. Nicholas Hotel in that city on June 20.

CARL K. WOLLAM, who recently left the aeronautical sales department of the Goodyear Tire & Rubber Company, has become associated with the All-American Aircraft Company, a newly organized Akron firm engaged in the manufacture of airplanes. Mr. Wollam gained a national reputation as a balloon pilot and last year during the National Balloon Race at Pittsburgh, by heroic work saved his own life and that of J. F. COOPER when their racing balloon was struck by lightning and caught fire.

W. C. BLAKES, general sales manager of the truck division of the Kelly-Springfield Tire Company, and F. BYRON, eastern district sales manager of the pneumatic tire division, spoke at a dinner at Newark, N. J., in honor of HERBERT BROOKS and CHARLES KINGSBURY, owners of the Brooks-Kingsbury Tire Company. This organization led all Kelly-Springfield distributors in a nation-wide sales contest for the first five months of 1929.

BRUCE BEDFORD, president of the Luzerne Rubber Company, Trenton, N. J., has been elected a director of the United New Jersey Railroad & Canal Company. Mr. Bedford will sail for Europe in the near future on a pleasure trip with his family.

WILLIAM C. YOUNG, head of the aeronautical department of the Goodyear Tire & Rubber Company, was the chief speaker at the weekly luncheon meeting of the Knights of Columbus Luncheon Club, held June 14, at the Elks Clubhouse, Akron, O. He spoke on the subject of "The Development of the Akron Airport."

V. R. JACOBS of the aeronautical department of the Goodyear Tire & Rubber Company was a speaker at the session of the Society of Automotive Engineers at Saranac Lake, N. Y., on June 27. He outlined the possibilities of airship transportation.

WILLIAM M. MCCONNELL, former air mail flyer, has been appointed pilot of the new Ford tri-motor airplane of the Firestone Tire & Rubber Company. He served with the Army Air Corps during the war and has more than 5,400 hours of flying to his credit.

EARL V. HENNECKE has taken up his new duties as vice-president in charge of sales of the Cooper Corporation, Findlay, O., manufacturers of tires and storage batteries. He was formerly president of the Automotive Equipment Association and for many years was vice-president and general manager of the Moto Meter Company.

W. P. NAISMITH, chairman of the India Tyre & Rubber Company, Ltd., has returned to Inchinnan, Scotland, after a conference with officials of the American company at Mogadore, O.

A. L. PIATT, Dallas branch manager of the B. F. Goodrich Company for 12 years, and H. D. OGLESBY, also a former Goodrich man, have opened a tire sales and service station at Fort Worth, Tex.

A. L. VILES, manager of the Rubber Manufacturers' Association, visited Akron on June 26 to confer with officials of the association and of the various rubber companies.

Rubber News Around the World

FALL IN DUNLOP SHARES CAUSES $50,000,000 LOSS

During the past month the market value of the 6s 8d ordinary shares of the Dunlop Rubber Company have steadily fallen away, due in part to the fact that the company's annual report did not equal expectations and in part to various rumors in circulation. Early in January, Dunlop shares were quoted as high as 26s 4½d, but by late June had dropped as low as 17s 2¼d. As there are 23,353,046 shares outstanding, this decline means a paper loss to stockholders in excess of $50,000,000.

The position is regarded as serious in some quarters, for at the company meeting on May 3 the directors were authorized to make an issue of 3,000,000 additional shares. The price of issue has yet to be determined, and it is reported as likely that the issue will not be made at the present time. When in May, 1928, the shareholders were offered 2,050,000 new shares, the price was 25s per share.

The fall in value last month is partly attributed to rumors to the effect that the company had lost the contract with the London General Omnibus Company. The secretary of the Dunlop Rubber Company, however, has officially denied this report.

Electric Hose in England

Further details regarding the acquisition of a factory at Watford, England, by the Electric Hose & Rubber Company, Wilmington, Del., reveal that the plant is a six-story building, which was constructed at a cost of more than $1,500,000 five years ago, but never used. The company has for many years had a subsidiary under the name of the Electric Hose & Rubber Company, Ltd., operating at 198 Westminster Bridge Road, London.

Goodyear Retires Preferred

C. H. Carlisle, president of the Goodyear Tire & Rubber Company of Canada, states that plans for the retirement of the bonded indebtedness and preferred stock issue of the Goodyear Cotton Company are being successfully carried out. The preferred issue of $475,000, which is callable at par, will be retired on July 1, while the bonds, amounting to $300,000 will be redeemed on September 30.

German Firms Combine

According to the German press, negotiations are at present under way between the Continental Rubber Works and the Gummiwerke Titan B. Polack A. G., of Walterhausen, regarding the absorption of the latter concern by the former. No definite decision has been reached, due to discussions of the ratio at which the shares of these companies are to be exchanged, but it is believed that an agreement will be brought about during the next few weeks.

Prominent Rubber Grower

William Duncan, who retired as chairman of the Rubber Growers' Association, Inc., at the end of April, was in Malaya when rubber planting was first undertaken, and soon came to be regarded as an authority on all matters pertaining to the industry with which he was closely connected for 28 years. For 12 years he was general manager of the Straits Rubber Company, Ltd., and Allied Companies. He was a member of the Federal Council of the Federated Malay States and for two years was chairman of the Planters' Association of Malaya. On Mr. Duncan's retirement from the East he joined the boards of the Straits Rubber Company, Ltd., and of several of the Allied Companies. He was a member of the original Stevenson Committee on restriction and represents the Association of British Malaya on the Colonial Office Advisory Rubber Committee. He assisted in a large measure to bring about the establishment of the Rubber Research Institute, was elected to the Council of the Rubber Growers' Association in 1921, and served as vice-chairman in 1927.

World Has 32,000,000 Cars

The world census of motor vehicles, compiled by the Automotive Division of the Department of Commerce, states that the total world registration of cars, buses and trucks as of January 1, 1929, was 32,028,584 vehicles. This total was made up of 27,007,965 passenger cars, 317,669 buses and 4,702,950 trucks. In addition, the census shows a world registration of 2,262,932 motorcycles. The total automobile registration in 1928 was 29,687,499 vehicles and in 1927, 27,650,267 vehicles.

Kaufman Plans Expansion

The Kaufman Rubber Company, Ltd., Kitchener, Ont., rubber footwear manufacturer, is planning an addition to its present factory on North Francis street in that city. The new structure, details of which have not yet been prepared, will cost in the neighborhood of $125,000.

PIRELLI COMPANY PROFIT $2,164,412 DURING 1928

Reports of the Pirelli Company, leading Italian rubber manufacturer, for the year ended December 31, 1928, show a net profit of $2,164,412 after depreciation, interest and taxes, equivalent to $6.98 a share earned on combined 273,000 shares of series A and 37,000 shares of series B stocks. This compares with $1,087,823 or $3.50 a share on combined stocks in 1927.

A consolidated pro forma balance sheet of the Pirelli Company of Italy and S. A. Filatura Mako and S. A. Tessuti Industriali, as of December 31, shows total assets of $35,467,246 as against $35,857,508 at the end of 1927. The surplus, however, has been increased from $13,981,036 in 1927 to $15,227,240 at the close of last year.

Net sales during 1928 totaled $22,324,211 as compared with $22,303,650 in the previous year. These figures, however, do not include the sales of the Pirelli International Company. The earnings include only the dividends received from Pirelli International and do not include the Italian company's proportion of the undistributed surplus earnings of the International company or the latter's own subsidiaries.

The National City Company, as depositor under the deposit agreement for the issuance of American shares of the Pirelli Company of Italy common stock, has announced that any holder of Italian shares of the company's common stock may deposit them, subject to the provisions and fees of the deposit agreement dated January 4, 1929, and receive therefor a corresponding number of Pirelli American shares listed on the New York Stock Exchange.

Canadian Dunlop Dividend

The regular quarterly dividend at the rate of 7 per cent per annum on the preferred stock of the Dunlop Tire & Rubber Goods Company, Ltd., was paid on July 2. This is the 93rd dividend paid by the Canadian Dunlop company without interruption since 1899 when the 7 per cent preferred stock was originally issued. The secretary-treasurer of the company reports that the organization has no banking indebtedness and is carrying a considerable holding of Dominion government bonds.

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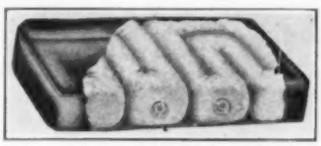
Rubber Goods and Specialties

Pneumatic Car Upholstery

Said to be favored by leading racing car drivers, Moseley Float-on-Air pneumatic upholstery is also adaptable to give increased comfort to the normal motorist. Sir Henry Segrave used this type of auto cushion when he drove to his world record



speed of 231 miles an hour. This upholstery is featured by a patent tubular construction which is unlike all other air cushions, according to the manufacturers, and which will save the motorist from headache and fatigue after long journeys. It is made and sold by David Moseley & Sons, Ltd., Manchester, England.

Wonder Window Washer

This newly patented window washer, manufactured by the Wonder Window Washer Corporation, 31 East 10th street, New York City, comes in two sizes, for home use and for commercial use. The Wonder window washer is made of steel, is rustproof and finished with high enamel. It has a self contained water tank which permits the water to filter through the felt

attached to one side of the tank when in use. The window is wetted by passing the felt end of the washer over it. The leveled rubber squeegee on the other side of the tank then dries and polishes the window. The handle is detachable and grooved or threaded to permit the use of a broom or mop handle to reach high corners. This washer has also been found useful for cleaning mirrors, tiled floors and walls, marble and enameled surfaces and other smooth planes.

Long Tom Rainbow Balloon

A popular addition to the line of the Anderson Rubber Company, Akron, O., is the Long Tom balloon in rainbow style and colors. This balloon can be inflated to a length of 48 inches. The Long Tom style of balloon is also made in the transparent style, with a single solid color. Either type is packed by the manufacturer one gross to a box, and both are said to be among the company's best sellers for the present summer season.

Soft Rubber Collar Stud

An American inventor has recently patented a collar stud of conventional design made of soft rubber and permanently attached to the neckband of the shirt. These studs, it is claimed, would thus remain in position throughout the life of the collar-band of the shirt, which may be laundered without removing the stud or damaging it.

Rubber Sole With Hemp Insert

By a new process, the Alfred Hale Rubber Company, Atlantic, Mass., is now producing a sport sole of rubber with a hemp insert in the sole and in the heel. This combination is said to provide an improved, light weight, long wearing and artistic sport sole, and it is offered in two designs—one for men and boys, the other for women and girls. According to the manufacturers, probably no material is so strong and at the same time so light in weight as hemp rope. The hemp used for this purpose has been treated and made practically moisture-proof and slip-proof. The improved "washboard" design will not pick up dirt, gives greater traction, and, while lighter in weight, through its centre insert, gives more firmness to the tread and longer wear.

Spring Wheel for Solid Tire

Demonstrations have taken place recently in Edinburgh of a new type of spring wheel, for which the claim is made that it will enable owners of automobiles to dispense with pneumatic tires and use solid or cushion tires instead. In this wheel the ordinary rigid spokes are replaced by two concentric series of springs, separated by a floating rim which distributes the load over the wheel. It is in the floating rim that the invention differs most from previous attempts to produce a spring wheel. The road demonstrations were apparently quite successful, the shocks and the vibration being taken up in the interior of the wheel instead of at the circumference.

Heeled Bathing Shoe

A novelty in bathing shoes has just been introduced for the present summer season by the Dela Rubber Company, Ltd., in the Deladip heeled shoe. This rubber shoe is said to give perfect comfort and protection on pebble beaches and is made in three

multicolored shades, red, blue or green being the predominating colors. It is strong, yet dainty and light, and has a stylish one-inch heel. The same company is offering several new items in its extensive line of Delasport tennis shoes.

Fifty-Fifty Golf Ball

Said by its manufacturers, the Burke Golf Company, Newark, O., to be the first ball in its price class to be guaranteed, the Burke Fifty-Fifty golf ball is now being offered to the sports world. The ball receives its name from the fact that its makers propose to assure the buyer 50 holes of perfect golf for 50 cents. The ball is retailed at that price and, according to its warranty, if it should cut through, crack or lose shape in 50 holes of play, it will be replaced without question. For those golfers who want extra yardage in their drives, this company also offers the new Long Burke, an unusually resilient ball, in which the manufacturer admits, "Frankly, we have sacrificed durability to gain more distance." This is sold at a price of 75 cents.

Horse Shoe Game

As an attractive combination of two of its popular items, the Schacht Rubber Manufacturing Company, Huntington, Ind., is putting out its Daisy horse shoe game and ring tossing game together. The set comprises

two five-inch rubber stands, four large rubber rings and four medium size rubber horse shoes. The two rubber stands are 7¾ inches in diameter, the horse shoes 4½ by 3¼ inches, and the rings 4½ inches in outside diameter. They are all packed in an attractive box, the entire set weighing two pounds.

Current Crude Rubber Items

COMMERCE CHAMBER FINDS RUBBER IMPORTS HIGHER

Imports into the United States in the first quarter of 1929 reached a value of $1,122,000,000, or about 5 per cent more than a year ago, according to *Our World Trade*, issued June 24 by the Foreign Commerce Department of the Chamber of Commerce of the United States of America. The quantities of crude rubber imported were the largest ever brought into the United States during a first quarter.

"The price of crude rubber for the quarter was considerably below that of a year ago," the Chamber reports. "In the first quarter of 1928 the average price per pound was 35.4 cents, while in the first quarter of this year it was 17.6 cents per pound, a decline of 50 per cent. At the low price we imported more than 386,000,000 pounds, or 52 per cent more than the record receipts of a year ago. The value, however was $68,031,000 or 25 per cent below that of last year."

TRADING REMAINS DULL ON RUBBER EXCHANGE

Little activity has marked the trading in rubber futures on the Rubber Exchange of New York during the past fortnight, the average amount of daily sales being even less than in the two weeks previous. Price quotations varied only over a range of 70 points until the final day and closed the period with a slight rally at a cent above the prices of two weeks ago.

December was the most active future position in the closing days, but dealers' brokers were noticed to be selling that delivery and purchasing September rubber. The table below indicates the daily fluctuations in price on the Exchange and the daily volume of sales transacted during the period.

Merger Plan Abandoned

The proposed merger of the Connemara, Allenby, Kundong and Balgownie rubber estates has been abandoned, according to the latest reports. Opposition from stockholders over the basis for the consolidation caused the dropping of the project.

Wood Joins Clearing House

Charles E. Wood, Inc., rubber broker, of 25 Beaver street, New York City, has joined the New York Rubber Exchange Clearing House Association. This firm has long been a member of the Rubber Exchange of New York, Inc.

Rubber Estates Merged

An agreement to acquire the Temburong estate in the State of Brunei has been signed by the directors of the Lawas (Sarawak) Rubber Estates. This property is adjacent to the Batu Apoi estate and has an area of 2,131 acres and an estimated annual production of 160,000 pounds of dry rubber. The revised estimate of the total crop from all the Lawas company's properties is approximately 1,120,000 pounds.

Suspended by Rubber Exchange

The board of governors of the Rubber Exchange of New York, Inc., at its regular meeting on June 17 suspended Elliott H. Simpson for a period of 60 days for violation of Section F of Rule 43 of the exchange. This section provides: "Misleading or ambiguous bids, offers or acceptances, as well as those of a frivolous nature, are strictly prohibited, and a member so offending shall in the first instance be subject to a fine in the discretion of the floor committee and/or upon complaint of the floor committee or of a member to the supervisory committee may be dealt with in accordance with Section 43 of the by-laws."

CONSUMPTION FIGURED AT 800,000 TONS FOR 1929

Crude rubber consumption by the United States alone during 1929 will attain a minimum figure of 500,000 tons and very possibly reach the record total of 520,000 tons, while consumption of the commodity by the rest of the world is proceeding at an equally large rate of increase over last year, according to dispatches from London quoting the foremost authorities in the industry to members of the Rubber Exchange at the end of June.

Consumption outside of the United States last year, according to government figures, totaled 242,032 tons, which this year will be increased to between 275,000 and 280,000 tons, and if these estimates prove correct, world consumption of rubber this year will attain the unheard of total of approximately 800,000 tons.

The London authorities claim that present prices (between 20½ and 21½ cents per pound spot New York) favor a world production of 765,000 tons, but that an 800,000 world production will only be attained in the event that the New York basis rises to between 25 and 26 cents.

The production costs of crude rubber in the Far East now ranges between a minimum of 5½d and maximum of 9½d, according to the producing plantation, equivalent roughly to between 12 and 20 cents per pound, concludes the release by the Rubber Exchange.

Rubber Consumption in Brazil

During 1928, 728 long tons of crude rubber was shipped from the Amazon Valley to Southern Brazil. This compares with 357 tons in 1927 and 202 tons in 1926, indicating increased activity of rubber manufacturers in the Sao Paulo and Rio de Janeiro districts.

Tapping During Low Prices

In explanation of the reasons for continued tapping of rubber estates when prices are unprofitable, the chairman of the Ulu Benut Consolidated Rubber Company has declared that even if tapping ceases on any estate it is not possible to cut out all expenditure. Estate upkeep, building and machinery maintenance, supervision and head office expenses can not be dispensed with, and the directors of this particular company concluded that a smaller loss would be incurred by continued tapping than by closing down.

Closing Prices on Rubber Exchange of New York, Inc.

FROM JUNE 18 TO JULY 2, 1929

		Spot	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Sales*
June	18	20.40	20.50	20.90	21.20	21.40	21.60	21.70	21.80	22.00	22.20	22.30	22.40	——	539
	19	20.30	20.40	20.70	20.90	21.10	21.30	21.40	21.60	21.80	22.00	22.10	22.20	——	358
	20	20.00	20.10	20.30	20.60	20.80	21.00	21.20	21.40	21.60	21.80	22.00	22.10	——	601
	21	20.10	20.30	20.50	20.80	21.00	21.20	21.40	21.70	21.80	22.00	22.10	22.10	——	364
	22	20.20	20.30	20.60	20.90	21.10	21.30	21.50	21.70	21.90	22.00	22.10	22.20	——	83
	24	20.20	20.20	20.50	20.80	21.00	21.20	21.40	21.70	21.90	22.00	22.10	22.30	——	469
	25	20.10	20.10	20.30	20.70	20.90	21.10	21.30	21.60	21.80	21.90	22.00	22.20	——	436
	26	20.30	20.30	20.50	21.00	21.10	21.30	21.50	21.80	22.00	22.20	22.30	22.50	——	558
	27	20.70	20.70	20.90	21.30	21.50	21.70	21.80	22.00	22.10	22.30	22.50	22.60	——	805
	28	20.50	20.50	20.70	21.10	21.20	21.40	21.60	21.90	22.10	22.30	22.40	22.60	——	539
	29	20.30	20.30	20.60	21.00	21.20	21.40	21.60	21.80	22.10	22.30	22.50	22.60	——	99
July	1	20.50	20.50	20.70	21.00	21.20	21.40	21.60	21.90	22.20	22.40	22.50	22.60	22.70	232
	2	21.00	21.00	21.30	21.60	21.80	22.00	22.20	22.40	22.60	22.80	23.00	23.10	23.20	727

*In lots of 2½ tons each

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GODFREY L. CABOT, INC., PLANTS NEAR COMPLETION

Godfrey L. Cabot, Inc., announce that construction of their new plants in Texas is progressing satisfactorily. Their present production is at a rate of over 200,000 pounds daily and will be 265,000 pounds daily before the end of the summer.

In Oklahoma, their plant at Lima will start operations about August 1st. This plant is to manufacture carbon black from fractions of raw gasoline removed in the last refining process at gasoline plants in the Seminole oil field.

National Issues "Tire Table"

The National Rubber Machinery Company, Akron, O, has just published a complete "Tire Table" of balloon tires and the cars that use them All sizes are listed, and the cars using them indexed for the years from 1925 to 1929, the table being compiled to include all possible listings up to April 1, 1929. In addition to the American cars, the balloon tire equipment for seven foreign automobiles is included.

Brown Instrument Expands

Though less than a year since the Brown Instrument Company completed the construction of a two-story addition to its plant, the rapid growth of the company's business has made necessary another expansion. A one-story wing is to be demolished and replaced by a new two-story and basement building, while a new central wing of the same height will also be erected. The new buildings will increase the floor space of the plant about 50 per cent.

U. S. Hartford Plant Busy

The Hartford, Conn., factory of the United States Rubber Company, which is devoted exclusively to the production of Royal cord tires, is working 24 hours a day, according to officials at the plant. Increases in unit sales volume have made the stepping up of production schedules necessary.

Firestone Suggestion Awards

Suggestion awards totaling $420 have been given to employes of the Firestone Tire & Rubber Company, according to an announcement made on June 6. A. Michael, a Plant No. 2 worker, received a check for $250 for an idea centered on an improvement in bead wire insulation.

CATALPO
for
Frictions

Firestone Loses Case

The Firestone Tire & Rubber Company and others were denied a review by the United States Supreme Court in a suit involving the question whether the creditors' committee of the Lexington Motor Company should be permitted to operate the latter's plant after receivership. The lower court had ruled that the receiver appointed by the court should operate the plant. The claims of the Firestone company and associated creditors amounted to $170,078.

Urges Waste Elimination

In an article in the *Executives Service Bulletin*, published by the Policyholders Service Bureau of the Metropolitan Life Insurance Company, Charles M. Haskins, secretary of the National Association of Waste Material Dealers, Inc., advocates a more thorough conservation and use of such waste as is an adjunct to any manufacturing operation. He refers to the statement of R. W. Phillips, head of the salvage and reclamation department of E. I. du Pont de Nemours & Company, that in 20 years 2,000,000 pounds of scrap rubber with a value of $43,000 passed through his department, along with other waste material worth $20,000,000.

Question Bath Mat Duty

A new test case on rubber mats was argued recently before the United States Customs Court at New York City. The mats in question, imported by Joseph A. Kaplan, were assessed by the collector at the rate of 40 per cent ad valorem under Paragraph 1022, Act of 1922, as "all other floor coverings." The importers are claiming duty at 25 per cent under Paragraph 1439 as manufactures of India rubber.

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U. S. RUBBER EMPLOYEES' INSURANCE PLAN GAINS

At the end of the third year of its operation, the Group Insurance Plan of the United States Rubber Company shows 27,284 employees carrying a total of $38,926,000 insurance. During the operation of the plan, a total of $390,000 has been paid on 253 death claims, and $59,500 on 28 total disability claims, a total of $449,500.

The plan is operated on a contributory basis, the employees paying a proportion of the premium, and the company underwriting the remainder.

Among salaried employees eligible to insurance, 9,804 or 92.8 per cent, are carrying insurance. Among wage employees, 17,480 or 89.1 per cent of the eligibles, are insured.

Combination Names Jobbers

The Combination Rubber Company, Trenton, N. J., announces that Nicols, Dean & Gregg, St. Paul, Minn., have been appointed agents for Viking tires and tubes in that territory, while Warshawsky & Company, Chicago, Ill., will cover the Illinois territory. The company has also selected other new agencies in the middle and northwest.

Murray Nears Capacity

The Murray Rubber Company, Trenton, N. J., is operating close to capacity in the tire and mechanical goods departments and is especially busy filling orders for casings for the many chain stores opened in the southern states. The company is planning to open additional chain stores throughout New Jersey.

The Philadelphia Rubber Works Company

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FOR SALE—Laboratory size Mill, Calender, Farrel Foundry & Machine Co. Press, and steam Vulcanizer with small accessories, also Scott tester. Box 523, THE RUBBER AGE.

FOR SALE—ABSTRACTS

CARD ABSTRACTS covering every important paper, publication and patent on Rubber and allied gums from 1907 to date. Arranged alphabetically by subjects with complete cross references. 40,000 cards in 24 Y & E oak cases. Address Box 515, THE RUBBER AGE.

FOR SALE—One small bomb for Bierer-Davis Rubber Ageing Apparatus, consisting of small size steel oxygen pressure bomb with safety valve and rack for holding samples, connecting arm, plate holder and wrench for closing. All in first-class shape. Address Box 519, THE RUBBER AGE.

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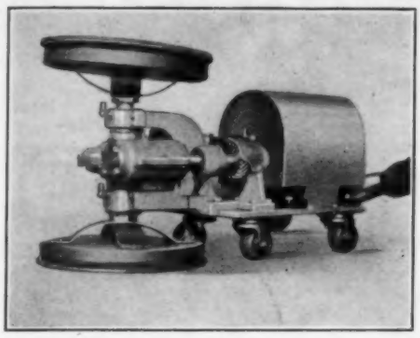

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LATE MARKET PRICES

Crude, Scrap & Reclaimed Rubber - Cottons and Fabrics

NEW YORK, JULY 2, 1929

COTTON

THE price trend of cotton has been downward during the past fortnight, causing the average spot price for the month of June to decline to 18.74 cents a pound in the New York market. This compares with average monthly prices of 19.41 cents in May, 20.29 cents in April and 21.50 cents in June of last year. In 1927, however, the average spot closing price for the month of June was only 16.85 cents a pound.

Better weather, laggard cables and heavy liquidation were responsible for the price decline, while the news of an appreciably greater acreage planted to cotton this year has helped the bearish position. The customary June improvement was shown by the cotton crop, but the weevil still remains a possible menace.

A better undertone has been evident in textile circles, with buyers showing more interest and the mills being less inclined to make concessions. May consumption by domestic mills was the largest on record for the month at 668,229 bales, comparing with only 577,384 bales in May, 1928. May exports, however, were light.

High, low and closing prices quoted on July 2 were as follows:

	High	Low July2	Close	Close June 17
July	17.85	17.70	17.85	18.52
Sept.	——	——	18.15	18.68
Oct.	18.39	18.20	18.39	18.79

Tire Fabrics

Tire fabric sales during the fortnight have been fair, with prices steady. There has been a narrower margin between Americans and Egyptians due to the decline in Egyptian cotton and the appreciation of the longer staple American grades. Latest price quotations were as follows:

CORD			
Peeler, carded, 23/5/3	lb.	.46½@	.47
Peeler, carded, 23/4/3	lb.	.47½@	.48
Peeler, carded, 13/3/3	lb.	.44½@	.45
Peeler, carded, 15/3/3	lb.	.45 @	.45½
Egyptian, carded, 23/5/3	lb	.53½@	.54
Egyptian, combed, 23/5/3	lb.	.57½@	.58
CHAFERS			
Carded, American, 8 oz.	lb.	.39½@	.40
Carded, American, 10 oz.	lb.	.40 @	.41
Carded, American, 12 oz.	lb.	.39½@	.43½
Carded, American, 14 oz.	lb.	.38½@	.43½
LENO BREAKER			
Carded, American, 8¼ oz.	lb.	.40 @	.46
Carded, American, 10¼ oz.	lb.	.40 @	.46
SQUARE WOVEN			
Carded, American, 17¼ oz. 23-11 ply	lb.	.46½@	.47½
Carded, American, 17¼ oz. 10-ply	lb.	.38½@	.39½

Sheetings

Sheetings in 40-inch widths were in somewhat better call in the course of the past fortnight, although individual commitments were small. There have been some sales under the market during the last two weeks. The latest price quotations:

40-inch, 2.50-yard	yd.	.12⅛@	.12¼
40-inch, 2.85-yard	yd.	.10½@	.10⅝
40-inch, 3.15-yard	yd.	.11⅛@	.11⅝
40-inch, 3.60-yard	yd.	— @	.09¼
40-inch, 3.75-yard	yd.	.08 @	.08¼
40-inch, 4.25-yard	yd.	.07 @	.07⅛

Ducks

Action in cotton ducks during the fortnight has been somewhat more spirited. Sales of enameling ducks have been made in appreciable quantities, and lesser lots of other goods have been sold. Prices have been steady, with closing quotations as follows:

Belting and Hose	lb.	.36 @	.36½
Enameling	lb.	.35 @	.36
Single filling	lb.	.14½@	.16
Double filling	lb.	.17½@	.18½

RECLAIMED RUBBER

While it is generally admitted that the second half of 1929 will not equal the record breaking first six months of the year in the consumption of reclaimed rubber, the most important question in the minds of reclaimers is How much of a decline will take place? Some authorities believe that the coming six months will approximate the first half of 1928 in amount of manufacturing activity at rubber plants. Most reclaiming plants have already curtailed their own production schedules and do not expect to be overstocked during the time of slackened consumption. Practically all grades of reclaim, however, have dropped in price during the fortnight, as indicated by the following late quotations:

High Tensile			
Super-Reclaim No. 1 Black	lb.	.12¼@	.12¾
Super-Reclaim No. 2 Black	lb.	.11¾@	.12
High Tensile Red	lb.	.12¼@	.12¾
Shoe			
Unwashed	lb.	.07 @	.07¼
Washed	lb.	.09¾@	.10
Tube			
No. 1 (Floating)	lb.	.13 @	.13½
No. 2 (compounded)	lb.	.10½@	.10¾
Tires			
Black, washed		.09½@	.10
Black, unwashed		.07¾@	.08
Black, selected tires	lb.	.08¼@	.08½
Dark Gray	lb.	.10 @	.10¼
Light Gray	lb.	.12 @	.12¼
White	lb.	.12½@	.13
Truck, Heavy Gravity	lb.	.07¼@	.07½
Truck, Light Gravity	lb.	.07¼@	.07½
Miscellaneous			
Mechanical Blends	lb.	.07 @	.07½
Red	lb.	.12¼@	.12¾

Scrap Rubber

Not only are reclaiming plants curtailing their output, but they appear to be fairly well stocked with scrap rubber for the time being. Price quotations on some grades have been somewhat easier during the past two weeks and sales lower, but a better demand is predicted for the late summer. Late prices follow:

(Prices to Consumer)

Auto tire peelings	ton	42.50	@45.00
Standard White auto	ton	47.50	@50.00
Mixed auto	ton	26.00	@27.00
Bicycle tires	ton	20.00	@22.50
Clean solid truck tires	ton	24.00	@25.00
Boots and shoes	cwt.	1.45	@ 1.50
Arctics, untrimmed	lb.	.00⅜@	.00⅞
Inner tubes, No. 1	lb.	.07¾@	.08
Inner tubes, No. 2, compounded	lb.	.04¾@	.04½
Inner Tubes, Red	lb.	.05¼@	.05⅝
Air Brake Hose	ton	32.00	@34.00
Rubber Hose	ton	17.50	@20.00

CRUDE RUBBER

PRICE quotations for crude rubber have held to the same low figures that prevailed at the close of the preceding fortnight, the second half of June being much lower than the first two weeks. The average spot closing price for the month was 20.64 cents a pound in the New York outside market, comparing with 21.46 cents a pound in May and 19.59 cents in June, 1928.

Lowered consumption by domestic factories in June was balanced by lowered imports, although stocks on hand as of June 30 are believed to have been higher than the 97,191 long tons reported for the end of May. The decline in the amounts of rubber being invoiced weekly to the United States from the East indicates that imports for the next few months will be at a considerably lower level.

A leading London broker points out that a falling off to a consumption of 40,000 tons a month by the United States in the second half of the year would still bring the 1929 total up to a figure well in excess of 500,000 tons. "Such a total," this broker states, "which seems to be well within the bounds of possibility, ought certainly to bring about a reduction in the current level of world stocks by the end of the year." On the other hand, another London authority, considering the high American consumption and the decline of stocks on hand in this country, says, "Good reason as these figures give for an optimistic market view, they are so phenomenally favorable that they may indicate the peak of an abnormal expansion to be followed by a serious depression rather than the prospect of a continuation of consumption at a similar exceedingly high rate."

Prices on the New York outside market on July 2 were as follows:

Plantations—			
Ribbed Smoked Sheets—			
Spot-July		.21⅛@	.21¾
July-Sept.		.21⅜@	.21⅝
Oct.-Dec.		.22 @	.22¼
First Latex, crepe spot		.21¾@	.22
Amber Crepe, No. 2		.19 @	.19¼
Amber Crepe, No. 3		.18¾@	.19
Amber Crepe, No. 4		.18⅛@	.18¾
Brown Crepe, Clean thin		.18⅝@	.18⅞
Brown Crepe, specky		.18⅜@	.18⅝
Liquid Latex, per gal.		1.00	
Paras—			
Up-river Fine		.22 @	.22½
Up-river Medium		Nominal	
Up-river Coarse		.12¼@	.12¾
Acre Bolivian, fine		.23 @	.23¼
Caucho Ball, Upper		.12¼@	.12¾
Islands, fine		Nominal	
Centrals—			
Central, scrap		@	.13
Esmeraldas		@	.13
Balata—			
Block, Colombia		Nominal	
Block, Ciudad		.54 @	

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot		10¾d@	10⅞d
July-Sept.		10⅞d@	11 d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot		d@	10⅛d

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LATE RUBBER CHEMICAL PRICES

Accelerators—Colors—Softeners—Compounding Materials

NEW YORK, JULY 2, 1929

THERE is little expectation that the tremendous volume of production by rubber factories in the first half of this year will be continued at the same rate through the remaining six months. Approximately 270,000 long tons of crude rubber have been consumed in the months from January to June, and American factories are generally beginning their summer curtailment programs. How great a decrease in factory volume will be made is at present the chief matter for speculation by the industry, but most signs point to a second half domestic consumption approaching 220,000 long tons. Suppliers of rubber chemicals and compounding ingredients are regulating their own output in line with the expected drop in demand.

The consolidation of the Kalbfleisch Corporation with the American Cyanamid Company has been the most important news of the fortnight among rubber chemical manufacturers. Two smaller chemical units have also been acquired by a subsidiary of American Cyanamid.

ACCELERATORS

Organic				
A-7	lb.	.55	@	.59
A-11	lb.	.62	@	.66
A-16	lb.	.57	@	.61
A-19	lb.	.58	@	.62
A-20	lb.	.64	@	.68
Aero-X	lb.	.60	@	.65
Aldehyde ammonia, crystals	lb.	.65	@	.70
Aniline oil, drums, f.o.b. works	lb.	.15	@	.16¼
Cryleno	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolylguanidine	lb.	.42	@	.52
Diphenylguanidine	lb.	.30	@	.36
Ethylidene aniline	lb.	.45	@	.47½
Formaldehyde Aniline	lb.	34	@	.44
Accelerator 102	lb.			
Accelerator 552	lb.			
Accelerator 808	lb.			
Accelerator 883	lb.			
Heptene	lb.	.40	@	—
Hexamethylene-tetramine	lb.	.62½	@	.65
Lithex	lb.	.18	@	.20
Methylenedianiline	lb.	.35	@	.45
Monex	lb.	3.25	@	—
Oxynone	lb.	.68	@	.80
Para-Nitrosodimethylaniline, f.o.b. works	lb.	.92	@	.96
Piperidine-Piperidyldithio-Carbamate	lb.	4.45	@	4.60
R & H 40	lb.	.40	@	.42½
R & H 50	lb.	.40	@	.42½
R & H 397	lb.	.75	@	.77½
Safex	lb.	1.20	@	1.25
Tensilac, No. 39	lb.	.50	@	.52½
Tensilac, No. 41	lb.	.50	@	.52½
Thermio F	lb.	.50	@	.55
Thiocarbanilide, drums	lb.	.26½	@	.28½
Thionex	lb.			
Trimene	lb.	.75	@	—
base	lb.	1.20	@	—
Triphenylguanidine	lb.	.58	@	.62½
Ureka	lb.	.75	@	1.00
Vulcanex	lb.			
Vulcone	lb.			
Vulcanol	lb.			
Waxene	lb.	.30	@	.32
Z 88	lb.	.50	@	.60
Inorganic				
Lead, sublimed blue	lb.	.08¼	@	—
Lead, white	lb.	.10½	@	.12½
Litharge, domestic	lb.	.09	@	—
Magnesia, calcined, light	per 100 lb.	5.35	@	5.45
heavy	per 100 lb.	3.65	@	3.75

COLORS

Blacks (See Compounding Materials)				
Blues				
Prussian	lb.	.35	@	.40
Ultramarine	lb.	.06	@	.30
Browns				
Sienna, Italian	lb.	.05½	@	.12½
Umber, Turkey	lb.	.04½	@	.07
Greens				
Chrome, light	lb.	.27	@	.31
medium	lb.	.28	@	.31
dark	lb.	.31	@	.34
Chromium Oxide, bbl.	lb.	.31	@	.38
Reds				
Antimony				
crimson, 15/17	lb.	.44	@	.50
sulfur free	lb.	.52	@	.60
golden 15/17 F.S.	lb.	.20	@	.25
Indian English	lb.	.09	@	.12
Domestic (Maroon)	lb.	.08	@	.12
Oximony	lb.	.13¼	@	—
Red oxide, pure	lb.	.10	@	.12
Venetian red	lb.	.03	@	.06
Vermillion, quicksilver, English	lb.	1.95	@	—
Whites				
Lithopone, Akcolith	lb.	.05 3/5	@	.06
Lithopone, Azolith	lb.	.05¼	@	.05⅝
Lithopone, Vanolith	lb.	.05¾	@	—
Titanox	lb.	.09¼	@	.10
Cal. Base Pigment	lb.	.10	@	.10½
Zinc Oxide—American Process				
American Azo:				
ZZZ (lead free)	lb.	.06½	@	.07
ZZ (leaded)	lb.	.06⅝	@	.06⅞
Zinc Oxide—French Process				
White seal	lb.	.11⅜	@	—
Green seal	lb.	.10⅜	@	—
Red Seal		.09⅜	@	—
Yellows				
Chrome	lb.	.16½	@	.17
Ocher, French medium	lb.	.02	@	.03
domestic	lb.	.01⅝	@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85	@	24.50
Ammonia carbonate	lb.	.10½	@	.12
Asbestine	ton	14.75	@	18.00
Barium carbonate	lb.	.03½	@	.05
Barium Dust	lb.	.05	@	.06
Barytes southern off-color,	ton	12.00	@	18.00
Western prime white	ton	23.00	@	—
imported	ton	27.00	@	36.00
Basofor	lb.	.04½	@	—
Blacks				
Arrow "Aerfloted"	lb.	.08½	@	.12½
Bone Black	lb.	.07	@	.08½
Carbon, compressed	lb.	.08½	@	.12½
Carbon, uncompressed	lb.	.08	@	.12
Drop Black	lb.	.06	@	.10
Fumonex	lb.	.06	@	.09
Gastex	lb.	.04½	@	.08
Lamp Black	lb.	.12	@	.40
Micronex	lb.	.09	@	.13
Velvetex carbon	lb.	.04½	@	.06
Blanc fixe dry f.o.b. works	lb.	.03½	@	.03⅝
Carrara filler	lb.	.01¾	@	.02
Catalpo (fact.)	lb.	.02	@	—
Chalk	ton	12.00	@	14.00
Clay, China, domestic	ton	8.00	@	9.00
Aerfloted Suprex	ton	10.00	@	22.00
Congaree, c. l. f.o.b. mine	ton	9.00	@	—
Mineral Flour, c. l. fob mine	ton	20.00	@	23.00
Tensulite		15.00	@	—
Glues, extra white	lb.	.22	@	.26
medium white	lb.	.20	@	.24
Magnesia, carbonate	lb.	.08¾	@	.11
Mica (muscovite) 160 mesh				
White, water grnd., c.l.	lb.	.06	@	—
White, water grnd., ton lots, whse.	lb.	.07	@	—
White, water grnd., less ton lots, whse.	lb.	.08	@	—
Off color (biolite)	lb.	.05	@	.07
Rotten Stone (powdered)	lb.	.02½	@	.04½
Soapstone, powdered	ton	15.00	@	22.00
Starch, powdered	cwt.	3.50	@	3.70
Talc, domestic	ton	12.00	@	15.00
Whiting, commercial	cwt.	.85	@	1.00
English cliffstone	cwt.	1.50	@	—
Superfine	ton	10.00	@	12.00
Witco	ton	12.00	@	—
Wood pulp XXX	ton	45.00	@	—
Wood pulp X	ton	25.00	@	—
Zinc Carbonate	lb.	.09½	@	.10½
Zinc Stearate	lb.	.24	@	.25

MINERAL RUBBER

Genasco (factory)	ton	50.00	@	52.00
Montezuma, solid	ton	28.00	@	36.00
Montezuma, granulated	ton	32.00	@	42.00
Paradura	ton	62.50	@	65.00
Pioneer, MR, solid	ton	42.00	@	45.00
Pioneer-granulated	ton	52.00	@	55.00
R & H Hydro-Carbon	ton	27.05	@	29.00
Robertson, MR, solid	ton	34.00	@	80.00
M.R. (gran)	ton	38.00	@	80.00

SOFTENERS

Acids				
Nitric, 36 degrees	cwt.	5.00	@	5.25
Sulfuric, 60 degrees	ton	10.50	@	11.50
66 degrees	ton	15.00	@	16.00
Tartaric, crystals	lb.	.37	@	.38
Acids, Fatty				
Stearex	lb.	.15½	@	.20
Stearic, double pressed	lb.	.17	@	.22
Alkalies				
Caustic soda, 76%	cwt.	3.76	@	3.91
Soda ash, 58% C.L.	cwt.	1.40	@	
Oils				
Corn, refined, bbls.	lb.	.11	@	.11½
Cottonseed, crude		.08½	@	.08¾
Cycline	gal.	.27	@	.34
Degras (c.l. 100 bbls.)	lb.	.03¾	@	—
Less c. l. (10-25 bbls.)	lb.	.04	@	—
Lots less than 10 bbls.	lb.	.04¼	@	.04½
Fluxrite	lb.	.05	@	.06
Hexalin	lb.	.60	@	—
Acetate	lb.	.70	@	—
Linseed, Raw C.L. bbl.	lb.	.09½	@	.10
Palm Lagos	lb.	.07¼	@	.07½
Niger	lb.	.07¾	@	.08
Vansulol	lb.	.10½	@	—
Para-Flux	gal.	.17	@	—
Petrolatum, white	lb.	.08	@	.08½
dark amber	lb.	.03¾	@	.03¾
Pine, steam distilled	gal.	.65	@	.70
Witco Softener (f.o.b. works)	lb	.02	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.06½	@	.07½
coal tar	gal.	.05½	@	.06
pine, 200 lb. gr. wt.	bbl.	9.00	@	10.00
Rosin, grade K, 280 lb.	bbl.	8.55	@	—
Pigmentar	gal.	.33	@	.41
Solvenol, drums	gal.	.45	@	.50
Tarol, drums	gal.	.30	@	.35
Tar Retort, 50 gal.	bbl.	12.50	@	13.00
Solvents				
Acetone, pure	lb.	.13	@	
Alcohol denatured, No. 1 bbls.	gal.	.37½	@	.44½
Benzol, 90%	gal.	.28	@	—
Carbon bisulphide	lb.	.05½	@	.06¼
Carbon tetrachloride	lb.	.06¼	@	.07
Motor gasoline, steel bbls.	gal.	.17	@	—
Naptha, solvent	gal.	.35	@	.40
Turpentine, spirits	gal.	.60	@	.64
wood	gal.	.50	@	.54
Waxes				
Beeswax	lb.	.56	@	.58
Carnauba	lb.	.33	@	—
Ceresin, white	lb.	.10	@	.11
Montan, crude	lb.	.07	@	.07½
Ozokerite, black	lb.	.24	@	.25
green	lb.	.26	@	.30
Paraffin (c. l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.03¾	@	
White crude scale 124/126	lb	.04	@	
Refined, 125/127	lb.	.05⅝	@	
Refined, 128/130	lb.	.05½	@	
Refined, 135/137	lb.	.07⅝	@	
Refined, 138/140	lb.	.08¼	@	
Miscellaneous				
RSL Mold Solution	gal.	.75	@	.100

ANTI-OXIDANTS

Albasan	lb.	.70	@	.75
Antox	lb.			
Neozone	lb.			
Oxynone	lb.	.68	@	.80
Resistox	lb.	.54	@	.57
Stabilite	lb.	.64	@	—
VGB	lb.	.55	@	.65

SUBSTITUTES

Black	lb.	.08	@	.14
White	lb.	.10	@	.16
Brown	lb.	.08	@	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03¼	@	.03½
Sulfur flour,				
Refined, 100% pure (bags)	cwt.	2.40	@	2.75
Commercial (bags)	cwt.	1.75	@	2.10

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

BOTH domestic consumption and imports are believed to have experienced a considerable falling off during the month of June, although no complete figures for either have as yet been released. It is likely, however, that stocks at the end of June will show a fair increase over the figure of 97,192 tons for stocks on hand at the close of May.

The amount of rubber invoiced to the United States has been approximately the same during the past fortnight as in the previous two weeks. Shipments from British Malaya have been slightly higher and shipments from the Dutch East Indies a little lower, leaving the totals unchanged.

Stocks of crude rubber in London have not varied greatly in the past two months, the amount on hand at the end of June being only slightly changed from that reported at the close of April. Only twice in the last nine years have London stocks been lower than at present at this time of the year.

Price movements during June were downward, the average for crude rubber at New York being 20.64 cents a pound as against 21.46 cents a pound in May. The London average price declined from 10.717 pence per pound in May to 10.580 pence per pound in June. Cotton was likewise affected, the June average spot price being 18.74 cents a pound as against a May average of 19.41 cents a pound.

Latest figures covering imports and exports from leading producing and consuming countries have been added to the appropriate tables in this section.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available. The section accordingly affords the most up-to-date, complete and convenient statistical service in the industry.

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U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1926:							
July	35,826	33,061,281	41.20	1,554	1,743,854	50.09	34,266
Aug.	27,400	24,670,752	40.21	1,318	1,339,563	45.38	26,082
Sept.	37,112	32,625,032	39.25	1,437	1,519,870	47.20	35,675
Oct.	29,746	25,320,558	38.40	1,366	1,316,270	43.03	28,110
Nov.	39,155	34,890,536	39.78	1,482	1,411,517	42.51	37,673
Dec.	37,754	33,261,366	39.33	1,904	1,841,305	43.16	35,850
1927:							
Jan.	43,340	36,753,719	37.86	1,525	1,444,734	42.28	41,815
Feb.	28,337	23,110,257	36.41	2,451	2,277,297	41.47	25,886
Mar.	35,515	28,693,016	36.07	2,763	3,249,665	52.50	32,752
Apr.	46,202	37,321,505	36.06	1,575	1,428,425	40.48	44,627
May	36,518	30,984,377	37.88	2,782	2,501,562	40.14	33,736
June	33,045	27,850,014	37.62	1,775	1,550,592	39.00	31,270
July	37,677	31,678,259	37.53	1,958	1,560,853	35.59	35,719
Aug.	32,810	26,396,931	35.92	1,809	1,382,768	34.12	31,001
Sept.	33,301	25,314,412	33 94	3,500	3,036,929	38.74	29,801
Oct.	30,184	22,163,282	32.78	2,513	2,042,713	36.29	27,671
Nov.	28,592	27,395,428	31.69	2,469	2,014,196	36.43	26,123
Dec.	30,737	22,213,574	32.26	2,655	2,245,754	37.77	28,082
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,835	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.	43,511	17,580,966	18.04	2,738	1,165,743	19.00	40,773
1929:							
Jan.	57,564	22,872,943	17.74	3,663	1,773,401	21.61	53,901
Feb.	64,265	24,760,111	17.20	2,955	1,374,783	20.77	61,310
Mar.	50,604	20,380,905	17.98	4,218	2,094,037	22.16	46,386
Apr.	55,725	25,542,726	20.46	3,293	1,624,237	22.02	52,432
May	51,161	24,355,511	21.25	2,386	1,349,690	21.24	48,325
June							

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1922	1923	1924	1925	1926	1927	1928	1929
Jan.	16,938	30,106	29,058	29,638	32,196	31,518	34,403	43,002
Feb.	14,767	30,149	25,736	19,761	31,136	30,137	33,702	41,594
Mar.	21,408	36,629	28,385	33,498	32,936	36,141	35,688	44,730
Apr.	19,294	29,085	27,129	34,139	32,696	35,871	32,772	47,521
May	23,246	36,155	25,845	35,322	29,364	34,592	37,333	49,233
June	31,713	24,272	22,753	35,822	28,598	33,801	37,676	
July	24,522	17,685	23,396	36,053	27,577	29,219	37,407	
Aug.	29,631	20,359	28,982	35,909	34,533	33,460	42,927	
Sept.	24,410	17,594	31,497	31,691	32,904	27,214	39,882	
Oct.	26,881	21,321	31,520	29,047	29,836	26,790	40,857	
Nov.	24,950	20,437	27,289	28,853	28,080	26,792	37,461	
Dec.	25,070	31,902	27,199	28,748	26,293	25,492	31,232	
Totals	282,560	305,694	328,769	388,481	366,149	371,027	441,340	

Figures on Quarterly Basis

Quarter	1922	1923	1924	1925	1926	1927	1928	1929
Jan./Mar.		96,776	87,609	95,263	94,301	99,216	103,558	128,565
Apr./June	127,360	89,493	75,674	104,099	87,109	103,242	103,500	
July/Sept.		55,621	83,813	99,493	93,793	89,210	117,573	
Oct./Dec.	155,067	63,617	92,656	85,789	83,212	80,860	117,597	
Totals	282,427	305,507	339,752	384,644	358,415	372,528	442,227	128,565

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Total
Mar. 30	7,333	923	1,596	45	9,897
Apr. 6	9,234	1,037	1,975	10	12,256
Apr. 13	7,061	458	1,935	.....	9,454
Apr. 20	6,863	740	1,886	112	9,601
Apr. 27	7,808	1,212	1,723	108	10,851
May 4	6,573	888	2,374	166	10,001
May 11	6,798	852	1,148	213	9,011
May 18	8,026	1,011	2,028	126	11,191
May 25	7,020	558	2,070	115	9,763
June 1	6,024	759	2,044	45	8,872
June 8	6,117	1,102	1,808	68	9,095
June 15	6,812	983	1,521	99	9,415
June 22	6,393	802	1,555	132	8,882

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1926																																
December	86¾	87½	87½	87½	—	87	87	87½	87	87	87½	—	87½	87¾	87¾	88	88	88	—	88	88½	88½	88½	88¾	89	—	—	88½	88½	88¾	88¾	88¼
1927																																
January	—	—	88½	89	89¼	89¾	40¾	40¾	—	40½	40¾	40¾	40	89¾	89¾	88	89¾	88¾	89	88½	88¾	88¾	88¾	88¾	88	38	88½	88½	88	88	88	88¾
February	87⅞	87⅞	87⅞	87⅞	87⅞	—	87	87⅞	—	88	87⅞	87⅞	88	88	88	88	88	88	88	88	88	88	88	89	88	89⅜	89½	—	—	—	—	88¼
March	89¾	89¾	40	40¼	41	40¾	40¾	40¾	87⅞	40¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41½	41¾	41¾	41¾	41¾	41	41	41	41¼	41¼	41¼	41	41¼
April	41¼	41¼	41	41	41¼	41¼	41¼	41¼	41¾	41¾	41¾	41	41¾	40¾	41¾	41¾	40¾	40¾	40¾	40¾	40¾	40¾	41	41	41	40½	40¾	40½	40½	40½	40½	40¾
May	—	40¾	40¾	40¾	41	41	40¾	41	40¾	40¾	40¾	40¾	40¾	40¾	—	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	41	40¾	40½	40¾	40¾	40¾	40¾	40¾	40¾
June	40¾	40¾	40¾	40¾	—	39¾	39¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40½	40¾	40¾	40¾	40¾	40¾	40¾
July	85½	85½	85¼	85¼	85¼	84¾	84¾	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼	85¼
August	84	83¾	—	83¾	83¾	83¾	83¾	83¾	83¾	83¾	84¼	84¼	84¼	84	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼
Sept.	83¾	—	83¾	83½	83¾	—	83¾	83¾	—	83¾	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼
Oct.	85	85¼	85¼	85¾	86¼	86¼	86¼	—	87	86¾	86¾	86¾	86¾	86¾	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼
Nov.	40½	40¼	40¼	—	40¾	—	40¾	40¾	40½	40¾	—	40¾	40½	40	39¾	40¾	40¾	40¾	40¾	40¾	40½	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾
Dec.																																
1928																																
January	—	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼
February	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼	87¼
March	29	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾	28¾
April	—	27¼	27½	27½	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼	27¼
May	17½	17¾	18¼	18¾	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼	19¼
June	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾
July	—	19½	18½	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾
August	19½	19½	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾
September	—	—	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾	19¾
October	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
November	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾	18¾
December	17¾	—	17¾	17¾	17¾	17¾	17¾	18¼	—	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼	18¼
1929																																
January	—	22¾	18¼	18¼	18¼	18¼	18¼	18¾	18½	18¾	20	20	20	20	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20½	21¾	22¾	21¾	22¼	22¼	21¾	21¾	22¾	22¾	20¼
February	22	22	—	21¾	22¼	22¼	22¼	22¼	22¾	25¼	25¼	25¼	25¼	25¼	24¾	24¾	24¾	24¾	24¾	25¼	25¼	25¼	25¼	25¼	25¼	26½	26¼	26¼	26¼	—	—	24
March	26	26	26	26	26	25¾	25¾	25¾	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	25¼	23	22¼	22½	—	—	—	24½
April	23	23¼	22¼	22¾	22½	22½	22½	22¾	22½	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	—	19¾	19¾	19¾	19¾	—	21½
May	19¾	19¾	19¾	19¾	19¾	20¼	20¾	21½	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21¾	21¾	21¾	21¾	21¾	21¾	21¾
June	—	—	—	21¾	21¾	21	20¾	21¼	—	20¾	20½	20½	20½	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20½	20½	20½	—	—	—	20¾
July	21¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾	20¾

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents	1929 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25	20.14
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75	23.97
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82	24.55
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97	21.18
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99	21.46
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59	20.64
July	14.67	26.10	22.16	103.16	41.03	34.87	19.40	—
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46	—
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47	—
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83	—
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26	—
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97	—
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48	—

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Apr.	May	June	July	Day	Apr.	May	June	July
1	11⅛	9⅞	10¾	10⅝	17	10¼	11⅝	10½	—
2	11¼	10	—	10⅞	18	10	—	10½	—
3	11⅛	10	10⅞	—	19	10	—	10⅝	—
4	10⅞	—	10⅝	—	20	10⅛	—	10½	—
5	10⅞	—	10⅝	—	21	—	11½	10½	—
6	11	10⅛	10½	—	22	9⅞	11⅝	10½	—
7	—	10⅝	10⅝	—	23	10⅛	10½	—	—
8	11	10⅝	10⅝	—	24	10⅛	10⅝	10½	—
9	11	—	—	—	25	9⅞	10½	10½	—
10	11	10½	10½	—	26	10	—	10½	—
11	10⅞	10⅝	10⅝	—	27	10	10⅝	10⅝	—
12	10⅞	—	10⅝	—	28	—	10½	10⅝	—
13	10⅝	11	10⅝	—	29	9⅞	10⅝	10⅝	—
14	—	11⅜	10½	—	30	9⅞	10⅞	—	—
15	10⅜	11½	10½	—	31	—	10⅜	—	—
16	10⅜	11⅛	—	—					

Average Monthly Price Per Pound

Month	1927 Pence	1928 Pence	1929 Pence	Month	1927 Pence	1928 Pence	1929 Pence
Jan.	19.410	19.310	9.942	Aug.	17.202	9.300	—
Feb.	19.021	15.713	11.875	Sept.	16.293	8.530	—
Mar.	20.125	12.736	12.135	Oct.	16.366	8.807	—
Apr.	19.897	8.864	10.490	Nov.	18.159	8.596	—
May	19.769	8.845	10.717	Dec.	19.690	8.570	—
June	17.880	9.293	10.580	Average			
July	16.770	9.312	—	for Year	18.375	10.656	—

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	June	July	Day of Month	June	July	Day of Month	June	July
1	18.40	18.20	11	18.80	—	21	18.45	—
2	—	18.20	12	18.95	—	22	18.30	—
3	18.75	—	13	19.05	—	23	—	—
4	18.95	—	14	18.85	—	24	18.30	—
5	19.05	—	15	18.80	—	25	18.45	—
6	19.00	—	16	—	—	26	18.65	—
7	18.95	—	17	18.90	—	27	18.80	—
8	18.95	—	18	18.80	—	28	18.65	—
9	—	—	19	18.75	—	29	18.45	—
10	18.80	—	20	18.70	—	30	—	—
						31	—	—

Average Monthly Price Per Pound

Month	1927 Cents	1928 Cents	1929 Cents	Month	1927 Cents	1928 Cents	1929 Cents
Jan.	13.42	19.12	20.22	Aug.	20.04	19.25	—
Feb.	14.10	18.40	20.21	Sept.	21.95	18.67	—
Mar.	14.32	19.38	20.19	Oct.	20.22	19.62	—
Apr.	14.75	20.63	20.29	Nov.	20.22	19.84	—
May	16.07	21.58	19.41	Dec.	19.58	20.22	—
June	16.85	21.50	18.74	Average			
July	18.00	21.36	—	for Year	17.49	19.97	—

Stock of Crude Rubber in the U. S.

(All Quantities in Long Tons)

At End of	ON HAND			AFLOAT			ON HAND AND AFLOAT		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	76,172	110,244	76,342	45,312	41,256	78,596	121,484	151,500	154,938
Feb.	91,186	108,955	90,058	42,166	43,316	63,825	133,352	152,271	153,883
March	85,740	114,061	100,536	49,600	39,324	56,476	135,340	153,385	157,012
April	92,757	113,083	107,659	38,963	33,986	55,409	131,720	147,069	163,068
May	94,563	105,356	97,192	44,181	34,374	55,404	138,744	139,730	152,596
June	89,250	90,198		47,233	40,001		136,483	130,119	
July	98,469	43,242		40,687	42,304		139,056	125,546	
Aug.	96,148	68,994		40,937	51,875		137,085	120,869	
Sept.	97,829	68,851		37,966	48,566		135,793	117,417	
Oct.	97,452	66,421		42,804	41,571		140,256	107,992	
Nov.	101,034	61,956		37,076	68,119		138,110	130,075	
Dec.	100,130	66,166		47,938	68,764		148,068	134,930	

(Rubber Manufacturers' Association figures raised to 100%.)

Stock of Crude Rubber in London

(No. of tons in Wharves and Warehouses, including Latex)

At end of:	1921	1922	1923	1924	1925	1926	1927	1928	1929
Jan.	56,573	67,252	73,498	57,460	27,172	9,994	54,994	66,524	25,191
Feb.	59,439	67,623	70,483	56,732	23,425	10,004	58,826	62,964	25,554
Mar.	63,913	66,670	63,438	55,647	18,104	13,127	63,055	58,272	28,214
Apr.	68,759	68,637	58,770	54,559	12,949	18,773	66,897	53,425	31,368
May	70,403	70,146	54,439	51,615	5,895	20,384	67,169	44,628	
June	69,408	71,597	51,050	51,115	5,318	23,984	63,902	38,756	
July	71,065	71,515	49,937	52,073	4,258	27,727	63,717	35,429	
Aug.	73,211	72,112	58,427	49,700	4,619	30,165	64,491	32,084	
Sept.	72,175	70,977	54,523	44,011	5,453	35,077	68,236	31,440	
Oct.	69,229	68,536	58,891	37,523	5,086	42,138	69,569	24,207	
Nov.	70,786	68,548	60,074	33,593	3,869	44,057	67,050	17,775	
Dec.	69,792	72,299	60,246	29,488	5,697	48,918	63,793	19,815	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1928					
June	43,716	42,683	41,185	40,083	38,611
July	36,915	35,925	35,238	35,445	
August	34,294	33,649	32,591	32,815	
September	31,933	31,477	32,116	31,884	31,462
October	29,525	27,370	26,477	24,240	
November	22,919	21,494	20,194	18,724	
December	16,855	16,517	17,669	18,821	19,727
1929					
January	21,953	23,016	23,547	24,423	
February	25,389	25,413	24,757	25,005	
March	25,441	25,920	26,442	27,656	28,077
April	28,934	30,446	30,503	31,213	
May	31,580	31,127	30,955	30,893	
June	31,539	31,635	31,127	30,617	

Rubber in Singapore and Penang

(Stocks held by Dealers—Quantities in Long Tons)

End of	1927	1928	1929	End of	1927	1928	1929
Jan.	25,440	25,868	29,617	July	22,558	18,663	—
Feb.	26,766	22,867	32,373	Aug.	25,764	18,971	—
Mar.	27,844	20,538	29,437	Sept.	25,178	14,898	—
Apr.	24,543	16,946	26,474	Oct.	25,790	12,149	—
May	25,133	17,437	30,764	Nov.	28,369	29,188	—
June	21,898	18,207	—	Dec.	25,798	32,895	—

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1923	23,140,620	0.6	1926	24,199,524	78.3
1924	21,863,311	19.7	1927	19,700,003	79.1
1925	26,001,664	66.8	1928	24,247,282	81.6
1928			1929		
July	2,209,692	85.9	January	1,835,207	79.4
August	2,318,893	80.2	February	2,265,024	80.8
September	2,315,604	76.9	March	2,613,389	80.4
October	2,114,611	72.2	April	2,729,899	81.3
November	1,213,245	66.4	May	2,574,224	76.5
December	1,101,193	74.7	June		

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1925	1926	1927	1928	1929
January	14,386,000	17,582,000	17,888,000	20,938,000	22,602,000
February	13,210,000	15,814,000	18,240,000	21,136,000	22,776,000
March	14,890,000	19,302,000	22,464,000	24,041,000	28,495,000
April	19,013,000	20,848,000	23,371,000	25,712,000	32,019,000
May	20,459,000	24,213,000	26,579,000	27,355,000	
June	20,724,000	23,803,000	27,799,000	29,022,000	
July	22,879,000	24,752,000	29,784,000	30,960,000	
August	22,323,000	26,912,000	29,779,000	33,148,000	
September	20,177,000	22,929,000	28,409,000	29,691,000	
October	19,826,000	23,973,000	25,497,000	30,610,000	
November	18,024,000	20,618,000	24,400,000	26,222,000	
December	17,954,000	21,419,000	23,718,000	26,644,000	
TOTAL	223,865,000	262,165,000	297,928,000	327,932,000	

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928
Production	40,932	45,259	51,633	60,845	61,237	64,439	77,944
Shipments	39,987	45,204	50,120	59,262	59,002	64,059	74,296
Inventory[1]	6,132	5,772	7,427	8,142	10,456	10,264	13,624

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	4,965	5,358	6,722	4,932	5,394	6,626	10,432	9,949	13,712
Feb.	5,095	6,363	6,912	4,458	5,031	5,282	11,075	11,721	15,495
Mar.	6,276	6,819	7,519	5,701	5,731	6,708	11,083	12,889	16,351
Apr.	6,299	6,178	7,884	5,701	5,812	7,294	12,122	12,717	16,929
May	6,151	6,759		5,657	6,457		12,462	13,024	
June	6,202	6,692		6,253	7,117		12,462	12,162	
July	5,087	6,498		5,973	7,895		11,326	11,157	
Aug.	5,752	7,469		6,393	8,403		10,721	10,034	
Sept.	4,822	6,802		5,717	7,145		9,722	9,765	
Oct.	4,773	7,326		4,799	5,717		9,665	11,520	
Nov.	4,502	6,075		4,306	4,998		10,136	12,579	
Dec.	4,497	5,605		4,165	4,591		10,264	13,624	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928
Production	50,850	60,116	70,706	82,614	76,618	70,823	80,180
Shipments	49,673	59,072	68,016	81,004	71,591	72,896	77,127
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692	16,117

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	5,337	5,441	6,517	6,016	6,072	7,242	15,585	12,982	15,386
Feb.	5,658	6,895	6,769	5,120	5,431	5,278	16,075	14,650	16,999
Mar.	7,184	6,231	7,466	6,157	5,731	6,737	17,096	15,573	17,750
Apr.	7,373	6,661	7,634	6,359	5,702	7,164	17,801	16,638	18,184
May	6,737	7,168		6,140	6,300		18,389	17,702	
June	6,306	6,953		6,832	7,136		17,858	17,159	
July	5,284	6,674		7,070	8,729		16,004	14,974	
Aug.	6,480	8,343		7,983	9,350		14,664	13,931	
Sept.	5,651	7,103		6,758	7,154		13,511	13,543	
Oct.	5,065	6,929		5,024	5,662		13,539	15,285	
Nov.	4,775	5,592		4,723	5,002		13,585	15,743	
Dec.	4,969	5,184		4,712	4,858		13,692	16,117	

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			Grand Total
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	
1922	2,547,208	2,302,923	244,285	102,053	94,904	7,149	2,649,261
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927							
July	268,474	236,866	31,608	10,987	8,719	2,268	279,461
Aug.	308,807	274,378	34,429	12,526	10,139	2,387	321,333
Sept.	260,420	226,440	33,980	11,262	8,681	2,581	271,682
Oct.	219,712	183,041	36,671	7,791	6,236	1,555	227,503
Nov.	134,381	109,742	24,639	6,617	5,173	1,444	140,998
Dec.	133,178	105,784	27,394	3,435	2,277	1,158	136,613
TOTAL	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928							
Jan.	225,039	199,032	26,007	8,463	6,705	1,758	282,502
Feb.	323,368	290,830	32,358	12,504	10,315	2,189	335,872
March	412,825	371,408	41,417	9,724	7,478	2,246	422,549
April	409,948	364,877	45,071	24,240	20,546	3,694	434,188
May	425,990	375,798	50,192	33,942	29,764	4,178	459,932
June	396,967	356,439	40,528	28,399	25,341	3,058	425,366
July	390,445	337,933	52,512	25,226	20,122	5,104	415,671
Aug.	458,429	400,689	57,740	31,245	24,274	6,971	489,674
Sept.	413,722	358,872	54,850	21,193	16,572	4,621	434,915
Oct.	397,096	339,976	57,120	18,536	13,016	5,520	415,632
Nov.	256,936	217,256	39,680	11,769	8,154	3,615	268,705
Dec.	233,135	205,144	27,991	9,425	6,734	2,691	242,560
TOTAL	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929							
Jan.	402,154	350,617	51,537	21,501	17,164	4,337	423,655
Feb.	466,084	407,589	58,495	31,287	28,486	2,801	497,371
March	584,733	513,266	69,559	40,621	32,833	7,788	625,354
April	620,656	538,679	81,977	41,901	34,392	7,509	662,557
May	603,969	516,055	86,596	31,559	25,129	6,430	635,528
June							

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA[1]							DUTCH EAST INDIES[2]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[3]	India & Burma[4]	Sarawak[4]	British North Borneo[4]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[4]	Amazon Valley	All Other[4]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,958
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,866
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1927:															
Apr.	29,041	13,069	15,972	3,349	723	984	452	526	4,666	5,581	10,197	557	2,451	1,520	46,928
May	31,393	15,491	15,902	3,124	760	786	415	348	5,430	5,529	13,410	586	2,460	1,207	49,957
June	32,607	14,706	17,901	3,348	856	1,100	539	409	4,818	5,518	9,109	772	889	1,731	46,990
July	28,947	12,697	11,250	4,018	827	859	544	333	4,771	6,142	11,566	519	1,757	1,113	43,699
Aug.	30,371	17,105	13,266	5,357	688	1,133	623	546	4,355	6,682	12,440	716	1,928	969	48,708
Sept.	29,835	12,096	17,740	4,911	479	645	566	498	3,635	5,957	9,853	497	2,072	1,213	48,066
Oct.	29,846	15,801	14,045	5,245	802	721	591	542	3,810	7,755	13,633	775	2,752	939	51,520
Nov.	28,277	19,860	8,417	4,464	1,277	1,241	591	600	4,127	6,587	14,395	683	2,369	1,627	46,378
Dec.	32,185	17,865	14,320	4,130	1,395	946	592	664	5,763	7,878	13,438	1,191	3,340	1,444	55,101
1928:															
Jan.	27,789	16,618	11,171	3,830	1,605	842	581	525	4,851	7,988	11,774	1,100	2,273	1,025	47,565
Feb.	28,848	12,911	15,937	4,947	1,081	667	581	536	4,052	6,757	8,630	787	1,612	1,276	46,860
Mar.	27,879	10,508	17,371	3,683	775	645	581	269	3,999	5,825	9,690	700	2,750	1,211	47,499
Apr.	20,189	9,385	10,804	3,233	789	630	494	258	3,993	5,040	5,499	736	1,014	1,323	33,810
May	26,483	10,350	16,133	3,091	654	842	494	241	4,943	5,355	10,347	717	2,602	1,135	45,994
June	22,994	16,168	6,826	3,107	963	926	494	451	5,419	5,863	13,655	725	1,399	960	40,788
July	30,481	13,383	17,098	5,129	1,043	905	593	366	5,602	7,566	11,594	698	1,264	873	52,731
Aug.	35,674	15,114	20,560	5,720	398	1,227	593	544	5,668	7,438	11,893	712	1,732	450	56,936
Sept.	29,769	11,239	18,530	4,675	457	938	594	447	4,956	6,536	9,863	969	1,614	494	50,073
Oct.	24,476	12,603	11,873	3,999	864	949	564	457	5,295	7,474	10,124	513	1,399	732	44,243
Nov.	68,135	10,436	57,699	8,005	1,048	772	564	425	4,950	7,902	7,805	943	1,790	623	92,526
Dec.	66,763	11,122	55,641	7,848	1,113	744	565	294	5,120	8,792	10,896	948	2,220	588	94,769
1929:															
Jan.	52,546	13,415	39,131	8,301	1,664	873	500*	461	5,640	8,067	11,076	395	2,134	642	78,884*
Feb.	47,926	12,103	35,823	6,943	1,117	955	500*	495	6,572	7,511	10,384	965	2,104	520	73,889*
Mar.	49,448	14,553	34,895	6,713	1,413	758	500*	499	5,515	6,620	10,629	741	2,332	786	71,401*
Apr.	49,816	11,414	38,402	4,676	727	747	500*	306	5,997	6,645	11,321	568	1,950		
May	43,960	15,593	28,367	4,850		966	500*	453	6,264	6,961	13,437	650	1,922		

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927 and 1,437 in 1928. (3) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included— such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928. (4) Official statistics. (5) Imports into Singapore and Penang. (6) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, and 1,459 tons in 1928. (8) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States*	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ee)	Australia (ed)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	18,885	11,890	11,746	5,297	6,122	62	1,515	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	549	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	-3,807	1,778	589	567	395,888
1923	300,872	12,700	27,392	18,519	18,277	15,872	8,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	5,764	2,346	3,124	2,688	-807	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	516,493
1926	395,667	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	613,643
1927	398,483	60,249	34,271	35,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	627,789
1928	404,496	4,846	36,498	37,855	30,447	25,621	12,435	15,184	8,430	7,958	2,243	4,418	3,178	3,138	596,696
1927:															
April	44,627	7,875	2,810	2,393	1,509	2,181	781	1,972	762	448	58	230	177	218	65,541
May	33,736	2,896	2,006	3,350	2,519	1,084	918	887	694	626	-57	335	155	223	49,402
June	31,270	2,282	2,387	3,632	2,086	798	942	1,506	557	583	-17	243	164	183	46,616
July	35,719	1,116	2,384	2,899	2,104	1,505	1,007	415	900	429	66	227	177	236	49,184
August	31,001	3,463	2,795	3,119	2,013	1,970	1,274	386	650	604	-63	312	138	123	47,786
September	29,801	7,800	1,956	2,891	1,850	2,025	684	518	772	552	-33	451	155	272	49,694
October	27,671	5,888	3,479	4,202	1,790	1,966	1,021	1,075	908	465	156	401	153	363	49,536
November	36,123	1,687	3,661	4,209	1,916	1,575	1,167	1,312	836	749	298	474	246	317	54,570
December	28,082	309	4,696	3,108	2,302	2,710	1,462	1,453	1,242	784	-202	514	268	300	47,028
1928:															
Jan.	37,120	1,921	1,764	2,485	2,290	1,361	760	755	802	589	52	261	335	376	50,871
Feb.	30,926	3,143	2,526	2,984	2,553	1,248	457	783	616	599	98	307	296	297	46,813
Mar.	36,893	3,179	1,902	3,521	2,989	1,694	763	231	918	816	95	351	497	398	54,247
April	35,663	—2,280	2,204	2,719	1,988	2,334	1,114	1,820	832	575	280	339	304	159	48,001
May	28,660	—5,322	3,297	2,944	2,180	2,288	1,090	3,893	655	746	209	485	220	213	41,558
June	25,143	—3,031	3,597	2,968	2,186	2,102	984	4,111	348	743	133	346	251	182	40,063
July	28,170	—1,374	3,518	3,387	2,692	2,026	1,598	724	591	895	395	294	175	384	43,475
Aug.	28,827	48	3,527	2,744	2,447	1,868	875	632	707	519	316	359	58	94	43,021
Sept.	36,800	4,199	3,524	3,553	2,812	1,837	1,278	20	603	597	345	377	277	235	56,457
Oct.	41,667	—934	3,728	4,386	2,943	3,711	1,049	98	766	696	141	527	250	318	59,346
Nov.	33,846	—3,141	3,278	3,694	2,799	2,150	1,340	689	837	544	31	337	252	282	46,938
Dec.	40,781	8,438	3,633	2,470	2,618	3,002	1,145	1,378	755	639	148	435	263	200	65,905
1929:															
Jan.	53,922	11,951	5,645	4,711	3,759	3,776	1,481	956	1,061	749	218	638	179	525	89,571
Feb.	61,331	5,179	5,001	4,613	2,908	2,727	1,259	689	1,131	627	113	226	115	356	86,275
Mar.	46,391	9,068	4,409	4,586	4,961	2,630	1,515		725	931	316	354	80	409	
Apr.	52,447	8,295	3,041	5,351	3,177	2,328	1,407		1,518	750	144	956			
May									1,437						

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. *United States imports of guayule are not included in this compilation; such imports amounted to 4,305 tons in 1926; to 5,010 tons in 1927; and to 3,076 in 1928.

Domestic Production of Miscellaneous Rubber Goods

	Rubber Proofed Fabrics Yards	Rubber Heels Pairs	Rubber Soles Pairs	Mechanical Goods Shipments Dollars
1924	25,020,000	186,279,000	(1)	$48,615,000
1925	23,988,000	206,970,000	16,211,620 (2)	64,877,000
1926	29,328,000	183,312,000	12,253,000	76,789,000
1927	37,872,000	201,014,000	27,160,000	68,625,000
1928	41,179,000	235,170,000	37,645,000	69,114,000
1928:				
January	2,177,000	17,682,000	3,431,000	$5,630,000
February	2,575,000	19,181,000	3,628,000	5,838,000
March	2,853,000	22,583,000	3,747,000	6,675,000
April	2,416,000	18,575,000	2,928,000	5,406,000
May	2,744,000	21,597,000	3,519,000	6,274,000
June	2,953,000	18,763,000	3,321,000	6,126,000
July	3,447,000	17,620,000	3,168,000	5,157,000
August	4,613,000	21,289,000	3,461,000	6,306,000
September	4,966,000	21,451,000	2,725,000	5,393,000
October	5,914,000	21,932,000	2,297,000	5,837,000
November	4,173,000	18,686,000	2,649,000	5,201,000
December	2,348,000	15,811,000	2,771,000	5,271,000
1929:				
January	2,828,000	19,975,000	3,876,000	6,033,000
February	3,095,000	18,979,000	2,869,000	6,135,000
March				7,013,000

(1) Not available; (2) Last 9 months only.
Source: "Survey of Current of Business of the Department of Commerce."

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Gutta Percha	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,332	2,213,964	2,900	1,068,698
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	851,893	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	818	281,012
1923	1,155	542,227	700	898,524	4,565	853,308	912	375,167
1924	1,356	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,805	2,562,096	354	327,213	7,268	3,127,757	1,445	661,156
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928:	3,075	1,755,685	731	430,855	7,552	2,540,059	1,597	777,128
Jan.	432	242,339	27	24,218	588	183,705	150	86,702
Feb.	489	281,295	35	32,165	403	142,621	312	215,085
Mar.	575	365,927	32	26,460	829	388,616	115	57,833
Apr.	512	312,131	47	32,924	592	174,970	68	27,627
May	452	233,414	—	——	679	226,064	100	42,762
June	424	220,081	9	6,799	293	91,152	28	12,374
July	191	100,342	123	46,747	373	113,295	81	27,344
Aug.	—	——	399	165,460	451	126,962	147	60,738
Sept.	—	——	60	38,198	2,028	713,736	125	56,768
Oct.	—	——	121	59,358	429	129,065	239	94,570
Nov.	—	——	59	41,119	472	140,116	88	35,409
Dec.	—	——	83	58,811	522	156,154	145	59,911
1929:								
Jan.	—	——	46	30,374	484	152,260	138	62,950
Feb.	—	——	82	70,209	823	255,594	40	19,806
Mar.	—	——	90	75,444	428	122,026	1	1,140
Apr.	83	38,241	163	93,240	1,086	315,621	1	1,086
May	125	57,260	70	67,891	752	212,400	76	24,053

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

Year	Production	Consumption	% to Crude	Stocks*	Year	Production	Consumption	% to Crude	Stocks*
1919	81,366	73,535	36.3	.....	1924	80,079	76,072	22.4	.....
1920	86,395	75,297	38.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,834	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....	1928	208,516	200,200	45.4	24,785
1927:									
Jan.	16,526	12,374	39.3	25,903	July	15,488	13,842	47.4	26,599
Feb.	15,860	14,424	47.3	27,291	Aug.	15,109	15,836	47.3	25,157
Mar.	16,788	13,528	37.4	27,124	Sept.	14,392	14,790	54.3	23,429
Apr.	14,483	16,677	46.5	25,712	Oct.	16,127	17,292	64.5	22,176
May	16,159	15,754	46.1	26,419	Nov.	15,477	14,876	55.5	21,728
June	16,652	15,547	46.0	25,811	Dec.	16,083	13,431	52.7	24,980
1928:									
Jan.	14,862	18,134	52.7	21,941	July	17,278	17,173	45.9	17,305
Feb.	15,291	16,808	49.9	20,848	Aug.	19,049	15,532	36.2	15,881
Mar.	17,069	18,619	52.2	19,558	Sept.	18,693	16,022	40.2	17,991
Apr.	15,393	17 355	52.9	19,283	Oct.	17,182	16,587	41.7	17,026
May	18,945	18,201	48.8	18,197	Nov.	18,245	16,547	44.2	22,399
June	18,781	16,328	43.4	18,709	Dec.	17,728	12,894	41.3	24,785
1929:									
Jan.	18,685	19,453	45.3	24,394	July				
Feb.	18,094	17,846	42.9	23,305	Aug.				
Mar.	19,984	18,782	41.9	22,076	Sept.				
Apr.	19,899	20,191	42.5	20,680	Oct.				
May	20,385	20,858	42.4	19,479	Nov.				
June					Dec.				

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927 and 9,577 tons in 1928.

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